ASSESSING THE FEASIBILITY OF EMERGING TECHNOLOGIES AS A RESEARCH KNOWLEDGE MANAGEMENT TOOL IN ACADEMIA: A CASE STUDY IN A SOUTH AFRICAN CONTEXT

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Dissertation submitted in fulfilment of the requirements for the Degree

MAGISTER TECHNOLOGIAE:

BUSINESS ADMINISTRATION

in the

Department of Business Support Studies
Faculty of Management Sciences

at the

Central University of Technology, Free State

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BLOEMFONTEIN
November 2019

DECLARATION

DECLARATION WITH REGARD TO INDEPENDENT WORK

I, MPHO AGNES MBEO (NÉE MAIANE), student number   , do hereby declare that this research project submitted to the Central University of Technology, Free State for the Degree MAGISTER TECHNOLOGIAE: BUSINESS ADMINISTRATION, is my own independent work; and complies with the Code of Academic Integrity, as well as other relevant policies, procedures, rules and regulations of the Central University of Technology, Free State; and has not been submitted before to any institution by myself of any other person in fulfilment (or partial fulfilment) of the requirements for the attainment of any qualification.

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30 November 2019
DATE

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ACKNOWLEDGEMENTS

Firstly, I take this opportunity to thank God and Saviour Jesus Christ for giving me strength and wisdom to complete this study. There were times when I felt like giving up, but God's power kept me going on.

Special thanks go to the people who assisted me while I was writing this dissertation.

First, I wish to express my appreciation and sincere gratitude to my academic supervisor, Professor Patient Rambe, for your unparalleled expert advice and unwavering support throughout the study period. You have not just fulfilled the role as my supervisor but also as my mentor with great fortitude. Your meticulous and gifted research ability has not only added value to my studies but also to my research profile as a whole. Thank you for showing me the ropes of research and standing by me in both good and challenging times.

My sincere appreciation and gratitude to the staff members in the Office of the Dean led by Prof. Herman Vermaak, both Academics and Support Staff in the Faculty of Engineering, Built Environment and Information Technology; and to All the staff at the Central University of Technology, Free State (CUT). Your support in this study has led to its successful completion as well as fulfilling its intended objectives. Also, your words of encouragement were always valued, and I hereby convey my utmost gratitude to each of you.

I give special thanks to my beloved parents (Ntate Jimmy and Mama Jeanett Maiane), my younger brother (Poloko Maiane) and my treasured niece, Jolliene, my mother-in-law (Mama Eugenea); and my dear husband, Ntate Mbeo, for always believing in me and taking care of the household and my beloved children, Tshepiso Mbeo and Junior Mbeo during my studies. I wish to express my appreciation for the love, understanding, encouragement, prayers and support, even in difficult times. It is only through your devout blessings as my family that I am able to achieve the successes in my life. Today marks a historic day for the Maiane's family name transition into the prominent world of academia and research. I am honoured to be the first to take it forth into the academic and research realm.

I also thank Prof. Irikidzayi Manase for his excellent language editing and proof-reading services.

I have no truer friend than Ausi Mamaki Litabe, Mme Makhabo Ramosoeu, Nnae Jacob Adedeji, Samuel Abejide and Adeyinka Akanbi. I acknowledge your friendship and both your sisterly and brotherly love. Thank you for the emotional support so gracefully given, which ensured my efficiency in completing this study.

My most gracious thanks to Prof. Henk de Jager, Prof. Alfred Ngowi, Prof. David Ngidi, Ms Edith Sempe, Prof. Bankole Awuzie and Prof. Mohammed Mostafa. I could not think of anything that could fully capture the essence of your contribution to the successes in my life. I am forever grateful for that and also for pushing me to reach new heights in my potential.

Lastly, I extend my special thanks to the Central University of Technology, Free State (CUT), for the financial assistance through Stars of Academia, Research and Support (SoARS) Fellowship they offered me throughout my studies.

LIST OF ACRONYMS

AR	Action Research
CoP	Community of Practice
CUT	Central University of Technology, Free State
ETs	Emerging Technologies
FEBIT	Faculty of Engineering, Built Environment and Information Technology
HEIs	Higher Education Institutions
HoDs	Heads of Departments
ICT	Information and Communication Technology
KM	Knowledge Management
NRF	National Research Foundation
RSS	Really Simple Syndication
SoARS	Stars of Academia, Research and Support
UoTs	Universities of Technology

ABSTRACT

This study considers the challenge of retaining the research knowledge of aging, experienced professoriate at Universities of Technology (UoTs), institutions with a nascent tradition of scholarly research, this study proposes a technology-supported framework for knowledge generation, retention and transfer for the Central University of Technology (CUT) Free State. CUT has been continually confronted with the risk of losing the research knowledge of highly experienced aging professors upon retirement, transfer or resignations. Given the absence of strong mechanisms and interventions for preserving tacit knowledge upon the departure of such senior academics, the need to develop practical frameworks for addressing such attrition at higher education institutions (HEIs) especially UoTs cannot be over-emphasised. The main objective of this study, therefore, was to develop an emerging technology (ET)-mediated knowledge management approach for the management (i.e. generation, transfer and retention) of research knowledge at CUT.

The study drew on the Interpretive Paradigm, Nonaka and Takeuchi's Theory of Organisational Knowledge Creation, an Action Research Approach, and detailed qualitative data triangulation involving in-depth semi-structured interviews, focus groups, document review and the author's reflections to establish the extent to which an emerging technology, SharePoint, would serve as a platform for generating, transferring and retaining research knowledge among experienced and emerging academics at CUT. The target population for this study was academics and research staff in the Faculty of Engineering, Built Environment and Information Technology who are already using SharePoint in informal ways. The collected data was then employed in developing a technology-enhanced knowledge management model through which the knowledge of the well-seasoned researchers and academics can be transferred to the inexperienced junior staff to prevent knowledge loss in higher education institutions.

The major findings of the study were the underutilisation of SharePoint by most academics, the overreliance on the local (L) drive for sharing academic meeting and policy information, the heavy workload of junior staff and senior academics' burgeoning administrative responsibilities that limited their involvement on knowledge management practices. Therefore, the development of an effective knowledge management framework was hampered by the following factors: academic's culture of working in silos, the existence of knowledge hoarding, the reluctance to share knowledge across racial and cultural divides and the lack of resource persons to facilitate the sustained use of emerging technologies in support of knowledge management.

However, there was also evidence to demonstrate that tacit knowledge can be assimilated from a comprehensive examination of the knowledge production interactions between senior academics and novices enabled by low threshold technology and collaborative sharing of content.

Based on these findings the study recommends a clear institutionalisation of policy on knowledge management and guidelines on how learning designers can tap into exemplars of effective use of SharePoint and other technologies and then use them for the wider roll-out of such technologies across campus. This study's insights are relevant to Higher Educational Institutions (HEIs) struggling to create a sustainable culture of scholarly research and grow a new generation of competent researchers amid the attrition of senior academics and the prevalence of systemic blockages in knowledge transfer processes.

Keywords: Knowledge management, emerging technology, SharePoint, Central University of Technology, talent retention and scholarly research outputs

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CHAPTER 1: ORIENTATION OF THE STUDY

1.1 INTRODUCTION

Knowledge is the most important strategic resource to a firm and has enormous effects on organisations' competitive advantage (Kang & Kang, 2010:1). The two main forms of knowledge are, first, explicit knowledge, which is formal, systematic in nature and can be tapped into, and second, tacit knowledge, which is extremely personal and very difficult to exploit or formalise (Nonaka 1994:16). Notwithstanding such variations in definition, both types of knowledge are essential to the growth of any organisation (Ngai & Chan, 2005:890). However, attrition of the tacit knowledge has been increasing in the recent past decades at an alarming rate as organisations lose portions of their workforce to the competition and/or retirement (Thomas, 2009:1). The negative result of such attrition is the depletion of companies' dependable and authentic knowledge sources. While such observations may have some resonance with private organisations that accord much premium to value creation and knowledge process to recoup their hard-earned investments, the same argument applies to Higher Education Institutions (HEIs), where critical research knowledge gaps exist between aging but highly experienced professoriate and a new generation of academics.

The retention of knowledge begins with the hiring of professionals who possess the right skills, mindsets and experience, and those with deliberate and persistent retention (Choo & Bontis, 2002; Frank, Finnegan & Taylor, 2004). However, the inescapable reality is that these professionals' eternal presence in organisations can never be guaranteed due to aging, early retirement, transfers (hiring by competitors) and dismissals. As such, there is a need for means to achieve knowledge retention. These means may entail strategies aimed at the development of human resource strategies to retain expert and critical knowledge (Frank et al., 2004:19; Martins, 2010:20), and the building of a critical mass of personnel that sustains the organisation across generations.

Generally, knowledge transfer is considered to be the core factor in the creation of new knowledge and maximisation of the value of knowledge (Kang et al., 2010:5-6). As a result, this research constitutes an endeavour to leverage, retain and transfer research knowledge of experienced professoriate at the Central University of Technology (CUT) in the Free State Province of South Africa. The CUT's Vision 2020 states that: "By 2020, Central University of Technology, Free State shall be an engaged university that focuses on producing quality social and technological innovations for socio-economic development, primarily in the Central Region of South Africa" (CUT Calendar, 2018). Consistent with its vision of becoming an

international entrepreneurial university, the CUT has been on a mission to build a new generation of leading researchers that can contribute significantly to new knowledge generation and innovation, improve research practices, implement new programs and resolve specific problems. It is in this spirit that this research strives to develop and assess the effectiveness of a technology-mediated knowledge management approach to leverage, transfer and retain expert research knowledge.

However, the process of leveraging, retaining and transferring research knowledge transcends the quantitative dimensions of increasing numerical numbers/values of the ranks of the professoriate. This process underlines developing a sound and sustainable strategy of making research quality, which is the core mandate of building a generation of leading researchers. Such structural changes transcend mere adaptation to existing current sub-optimal conditions of knowledge retention and transfer strategies towards embracing the transformative use of the university's competitive resources and capabilities. As a result, the most effective strategic resources at CUT's disposal in this sustainable knowledge retention model are various emerging technologies. Here, emerging technologies (ETs), are defined as those new or evolving technologies that can be used to enhance teaching, learning and creative inquiry, and result in the generation of knowledge (Johnson et al., 2011:3).

Mindful of the intergenerational tensions between aging professoriate and young academics occasioned by differences in the beliefs and perceptions that may frustrate the knowledge retention process (Burch & Strawderman, 2014:70-71), emerging technologies may serve as knowledge bridge that connects these perceivably heterogeneous generations as all are bound to use emerging technologies at CUT. The relevance of using emerging technologies, such as social network sites that include Facebook and Myspace, instant messengers that include Yahoo Messenger, Mxit, WhatsApp and 2go; and blogging applications (such as Twitter) for knowledge retention and transfer is founded on various reasons. These include their cost-effectiveness and affordability, capacity to transmit and disseminate big data banks, and user-friendliness as teaching and learning modalities (Helvie-Mason 2011:61; Johnson et al., 2011:3; Bozalek et al., 2013:419).

1.2   KNOWLEDGE MANAGEMENT: AN OVERVIEW

The field of knowledge management is of great importance in the commercial world partly because technological economies are increasingly becoming knowledge-based (Wallis, 2003). Knowledge management also assists HE managers in their administrative efforts of facilitating the acquisition, creation, storage, sharing, diffusion, development, and deployment of knowledge by individuals and groups (Zheng et al., 2010:764).

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1.3   KNOWLEDGE RETENTION AND TRANSFER CONTEXT

Nonaka (1991) defines knowledge generation as a continuous transfer, combination and conversion of the different types of knowledge as the users' practice, interact and learn. In addition, the five modes of knowledge generation are *Acquisition*, *dedicated resources, fusion*, *adaptation* and *networking* (Malhotra, 2002).

Knowledge, especially the institutionalised one, may be considered a property of an organisation, and yet it is institutionalised and originates as an inextricably personal property before it is institutionalised. Thus, the importance of knowledge in an organisation's competitiveness witness's entities looking for processes that will assist in the transfer of the knowledge of the well-seasoned employees to the inexperienced (Bussard, 2013:4). In fact, the quicker an individual can be trained to be a productive and proficient member of the department, the better the company, the co-workers and the individual are served. Unfortunately, organisations lack appropriate information about where their critical and tacit knowledge is, and therefore, encounter challenges y in getting it and making use of it (Davenport, 2000:40).

According to Madsen et al. (2003), and Nelson and McCann (2010:1), knowledge retention is a cost-cutting strategy, considering that knowledge is a valuable asset that has to be managed strategically to maintain a competitive advantage. As a result, knowledge retention is considered as providing a useful strategy to mitigate turnover challenges that threaten organisational survival and growth. Thus, it becomes critical that organisations should manage turnover challenges deliberately and purposefully through appropriate retention strategies that are capable of strengthening intellectual capital renewal and mitigating knowledge attrition or 'organisational forgetting' (Malthora, 2003; DeLong, 2004; Castro, 2008; Nelson & McCann, 2010). Therefore, organisations need to figure out beforehand, which knowledge, if lost, could undermine the organisational strategy (DeLong, 2004) and whose knowledge might be at risk of being lost (Martins 2011:51).

1.4   FACTORS NECESSITATING KNOWLEDGE RETENTION AND TRANSFER IN ACADEMIA

Knowledge transfer is a major concern in improving educational practices (Willmott, 1994) because managers and professional experts currently work in a rapidly changing technical and scientific environment. Such managers gain experiential knowledge, only some of which is formally documented and shared (Johnston, 2005:2). The continuance of the legacy of apartheid lies in the sustenance of remnants of skewed knowledge production on South

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African university campuses. For instance, white males still dominate the top academic ranks at South African universities (Badat, 2010:24) notwithstanding the strides made in addressing the gender and racial imbalances in the knowledge production processes. In addition to these skewed racial demographics, the most highly qualified, experienced and productive researchers who are experts in their chosen disciplines (i.e. professors and associate professors) at South African universities are above the age of 50 (Dube & Ngulube, 2013) suggesting the need for knowledge transfer as part of career planning. Unfortunately, this trend seems to be going on unabated (Badat, 2010; Van der Walt, 2010).

Furthermore, knowledge attrition is of concern in the academe world. As already noted, the most highly qualified, experienced and productive researchers and experts in their chosen disciplines (i.e. professors and associate professors) in South African universities are older workers above the age of 50 years (Dube & Ngulube, 2013). This is partly a consequence of the reduction in the retirement age for academic employees at the universities, from 65 to 60 years. This implies that most senior academics at South African Universities are due to retire in the next five to ten years. Therefore, there arises a need, based on the reality of this future knowledge loss of senior academics in South Africa universities and that there has been a slow progression of African scholars entering the professoriate bracket, to strategically retain and transfer knowledge in academe, if universities are to serve humanity in the wake of an aging workforce.

Nevertheless, this problem is not only peculiar to South African universities. Lom (2012) observes that Senegal would lose 60% to 70% of its academics by 2015 as a result of large-scale retirements at Senegal's premier Université Cheikh Anta Diop (UCAD) in Dakar. In response to the same quagmire, most South African universities have reverted to the retirement age of 65 for academic employees, even though this approach does not solve the problem entirely.

The challenge to this increasing recognition of the potential loss of talent at South African universities is the clear lack of a sound strategy for mitigating or eliminating the extent of academic damage emanating from such inevitable loss. The CUT has developed various interventions to deal with the transfer of knowledge from senior academics to junior academics. These interventions include mentorship programmes, Scholarship of Teaching and Learning (SoTL), Stars of Academe, Research and Support (SoARS), Talent Management Strategy and the use of SharePoint for knowledge dissemination (CUT research strategic plan). However, these interventions do not necessarily address the issue of knowledge attrition. Hence, there is a need for further interventions such as excellent linkages between the industries and university and the incorporation of emerging technology as a mediator to leverage, transfer and retain expert research knowledge.

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In view of the knowledge conversion and retention challenges, this study argues that the adoption of a long-term technology-mediated knowledge management approach, which covers the development, retention and transfer of research knowledge may go a long way in alleviating the problem of knowledge and expertise loss. For this reason, knowledge retention and management model drawing on Information and Communication Technology (ICT) and other novel technologies is critical to stemming this attrition. According to Alavi and Leidner (2001:13), knowledge management systems are the IT-based systems developed to support and enhance the organisational processes of knowledge creation, storage/retrieval, transfer, and application. This resonates with Ruggles' (1997) recognition of new technologies as knowledge management tools for enhancing and enabling the generation, codification and transfer of knowledge. Tarling and Ng'ambi (2016) echo that Emerging Technologies (ETs) are perfect instances of platforms for knowledge generation and subsequently transfer and retention.

1.5 EMERGING TECHNOLOGIES AS A LEVER FOR KNOWLEDGE GENERATION, TRANSFER AND RETENTION

1.5.1   Emerging Technologies for Knowledge Generation

Emerging technologies (ETs) serves as a platform for the dissemination and management of information that ranges from day to day activities, which if properly constituted and well documented, gives birth to knowledge. In addition, a consideration of the tacit knowledge from the perspective of this study indicates that ETs provide opportunities for generating personalised knowledge and skills as they render formal and informal personalised environments for the transacting of personal knowledge. Since the majority of these technologies (e.g. social media) were invented long after the baby boomers (those aged between 50 and 70) had already taken up their professions, their negative perceptions may undermine the uptake, appropriation and implementation of these technologies (Burch & Strawderman, 2014:70-71). Nonetheless, the knowledge bridge that proves indispensable even for boomers is academia sites such as Research-gate, Academia.edu, Linked-in and application software such as SharePoint, which act as collaboration suites for different people to share and work on the same project in HEI.

1.5.2 Emerging Technologies (ETs) for Knowledge Transfer and Retention

ETs seem to be the way out in response to the challenge posed by knowledge losses in HEIs, as the use of ETs is on the rise in the higher education sector worldwide (Bozalek et al., 2013:3). According to Johnson et al. (2011:6), ETs enhance teaching, learning or creative inquiry on university campuses and have the potential to become dominant in the near future. The importance of ETs, such as SharePoint, in knowledge retention, lies in the fact that they grow the institutional memory of the organisation. In this manner, employees can learn from past successes and failures to ensure positive results. Learning from others could help avoid going down the wrong paths or reinventing the wheel (Liebowitz, 2008:3).

According to Rambe and Mlambo, (2014), the Community of Practices (CoPs) describes a group of people who share a concern or a passion for something they do and learn how to do it better as they interact regularly. Senior academics and novice researchers in academic CoPs can use ETs are a potential platform for retention and transfer of knowledge. In this way, the ET enabled CoPs would provide good leverage for the conversion of knowledge to the new generation of workforce in the HEIs. Further engagements in a CoP include research novices' (postgraduates) mutual engagement in joint activities, collective problem solving and sharing of experiences about complex research processes including hunches on possible research alternatives. Therefore, CoP embodies social structures that focus on knowledge and enables the placing of knowledge management in the hands of practitioners (Wenger, 2004).

1.6 CONCEPTUAL FRAMEWORK

To the effect that this study proposes and seeks to assess the effectiveness of emerging technologies (ETs) knowledge management approach for the generation, transfer and retention of research knowledge. Thus, the approach/ model, as reflected in Figure 1.1, illustrates the environment (academe world), where senior academics interact with the junior academics and postgraduates. In this environment, knowledge is first generated and afterwards transferred, notwithstanding the obstacle that stands in the way of knowledge transfer such as information hiding and lack of knowledge on how to exchange knowledge effectively. These obstacles in the environment can be leveraged with the introduction of the emerging technologies platform, such as SharePoint for various reasons. The platform's applications such as SharePoint sites present opportunities for junior academics to observe first-hand the externalisation of knowledge by senior academics, provide snippets of information that serve as vital artefacts for augmenting emerging academics' knowledge in knowledge production. Overall, the activities in the environment which involve; knowledge

generation, retention and transfer is expected to yield various outcomes such as publications, patents and postgraduate student graduations.

Figure 1.1: ETs model for knowledge generation, transfer and retention
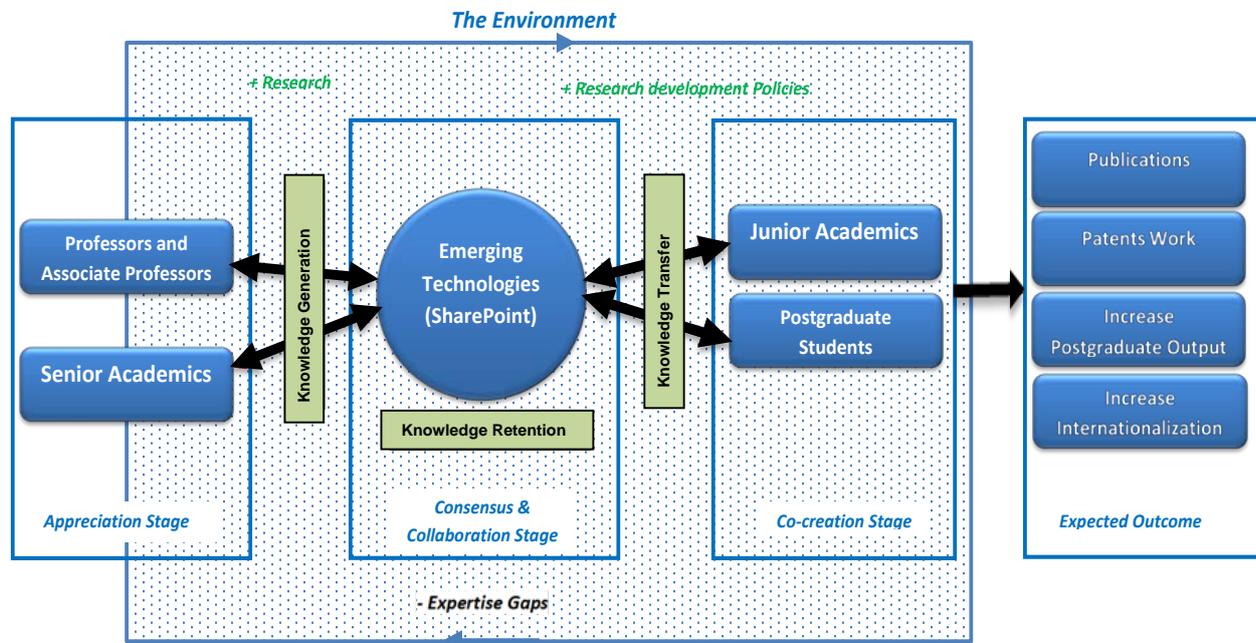
(Source: Author's compilation)

1.7   PROBLEM STATEMENT

Knowledge management research has highlighted the need for knowledge generation, transfer and retention, and proactive measures need to be instituted to address the potential acute shortages of research leadership in higher education in general and in SA in particular (Levine, 2008; Carman, Leland, & Wilson, 2010; Robison et al., 2010; McNair et al., 2011). The shortage of research leadership (such as professors and senior academic staff) in higher education could be a consequence of early retirement or outsourcing (Thomas, 2009:1). Furthermore, the potential gap between current leaders (senior academic staff) who are retiring and the qualified leaders who should fill the vacated positions is very disturbing (Joshi Dencker, Franz, & Martocchio 2010; Linder & Wald 2011).

In South African context, the Universities of Technology (UoTs) over the past 15-20 years had to primarily overcome two historical burdens which are; the burden of being financially disadvantaged because of apartheid policies and the burden of a paradigm that did not associate these institutions with a culture of research especially research excellence (Badat, 2010). These challenges are compounded further by the reality that the UoTs are still confronted with the burden of bridging the knowledge gap between a handful of senior highly

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experienced experts and their cadres of young and novice academics. The challenge of promoting the capacity of a young generation of researchers is acute in the social sciences where evidence of intense collaboration on research activities is almost non-existent. Thus, the limited exposure to research activities points to a disaster on the rise.

1.8   RESEARCH AIM

This research study aims at proposing and assessing the feasibility of a knowledge management approach founded on the utilisation of emerging technologies for knowledge generation, retention and transfer in a South African higher education context. This knowledge management approach is geared at ameliorating the risk of losing the prime research knowledge of a highly experienced aging professoriate upon retirement, transfer and resignation. If deemed effective, this model can be rolled out at other South African higher education institutions (HEIs), which are confronted with similar challenges in view of the absence of strong mechanisms and interventions for preserving tacit knowledge upon the departure of senior research academics.

1.9   RESEARCH OBJECTIVES

The following specific objectives are formulated in order to achieve the aim of this study:

1. To evaluate the selected current intervention strategies for research knowledge management (i.e. knowledge generation, transfer and retention) used at the CUT.

2. To identify existing research gaps which result in the loss of research knowledge at the CUT.

3. To evaluate the nature of ETs that could be harnessed in the knowledge management process (that is, the generation, transfer and retention of research knowledge) in selected CUT academic faculties worst affected by the departure of senior academics.

4. To evaluate the contribution of ETs that could be harnessed in the knowledge management process (that is, the generation, transfer and retention of research knowledge) in selected CUT academic faculties worst affected by the departure of senior academics.

5. To explore the emerging technologies that would be relevant and appropriate for the management (i.e. capturing, documenting, transferring and retaining) of research knowledge of senior academics at CUT.

6. To assess the feasibility of ETs in the management (i.e. generation, transfer and retention) of research knowledge among senior academics (professors and senior researchers) and emerging researchers at CUT.

7. To develop an ET-mediated knowledge management approach for the management (i.e. generation, transfer and retention) of research knowledge at CUT.

1.10 RESEARCH QUESTIONS

A failure of institutions to act quickly with well thought out long and short-term knowledge management approaches and plans will produce a future workforce that is unprepared to meet the institutions' and customers' needs. In view of this eventuality, the need to understand the current knowledge management architecture, including harnessing the affordances of impending knowledge production tools as well as the capacities, such as emerging technologies cannot be ignored. As a result, the following critical questions are posed:

1. What are the current knowledge management strategies (that is, strategies for the generation, transfer and retention of research knowledge) being adopted at CUT?

2. Which research gaps are inherent in CUT knowledge production strategies that have resulted in the loss of expert research knowledge at CUT?

3. What is the nature of emerging technologies (ETs) that could be harnessed in the research knowledge management process (that is, the generation, transfer and retention of research knowledge) in selected CUT academic faculties worst affected by the departure of senior academics?

4. What is the contribution of emerging technologies (ETs) that could be harnessed in the research knowledge management process (that is, the generation, transfer and retention of research knowledge) in selected CUT academic faculties worst affected by the departure of senior academics?

5. Which emerging technologies would be relevant and appropriate for the management (that is, capturing, documentation, transfer and retention) of such research knowledge?

6. How effective are ETs in the management (that is, generation, transfer and retention) of research knowledge at CUT?

7. How can an ET-mediated knowledge management approach be constituted to manage (that is, capture or document, transfer and retain) research knowledge and expertise of senior academics at CUT?

1.11 RESEARCH EPISTEMOLOGY

An epistemological approach captures the way knowledge is constructed, articulated and communicated to fellow human beings. To get a closer glimpse of how senior academics develop, constitute and transfer research knowledge, especially tacit knowledge of research processes, such as the conduct of scholarly research, conception and development of research papers, an interpretivist approach, will be adopted for this study. The interpretivist epistemology is often considered ideal when the researcher intends to understand the participants' views of their social world and their roles in it (Orlikowski & Baroudi, 1991:14). An interpretivist paradigm is considered ideal for this study in view of this study's preoccupation with the senior academics' knowledge production practices and social repertoires that include some inferences about their enactment and transfer of tacit research knowledge. This study seeks to understand phenomena of tacit knowledge negotiation and transfer through the meanings that people assign to these processes (Deetz, 1996). As a result, an examination of the lifeworlds of senior academics in their online learning communities offers a "window" into how these academics leverage, transfer and retain expert research knowledge. Therefore, an understanding of the different meanings that academics assign to such knowledge production processes, including their interpretation of the world, is relevant to this study.

1.12 RESEARCH APPROACH

A qualitative approach will be adopted in this study due to the nature of the research questions posed in this study and the descriptive nature of the phenomenon (that is, knowledge management) under examination. According to Creswell (2008b:7), qualitative research is an inquiry approach used for exploring and understanding a central phenomenon. In qualitative research, the researcher relies on the views of the participants and inquiries are conducted in a subjective manner (Creswell, 2008a: 46). Thus, for any research question to be answered, the researcher needs to ask the participants general questions in order to get their views and thereafter analyse the information to develop in-depth narratives and themes. Overall, this research method seeks to understand people's experiences in their world (Hancock, 1998:2). Hence, a qualitative approach is ideal for such an investigation owing to the qualitative nature of the enactment, documentation, application and transfer of knowledge (the knowledge management process), and the communicative repertoires and social practices that surround such processes.

1.13   RESEARCH DESIGN

A research design is an approach that provides specific directions to the procedures used in research (Cresswell, 2013:12). The study aims at identifying knowledge gaps in knowledge transfer and the existing knowledge transfer practices currently in use. The study focuses further on policy interventions on knowledge retention and observes the explicit and tacit processes of knowledge transfer between the retiring experts and the young novice academics, as well as documenting such practices.

Action research becomes significant here. Action research underlines a detailed preliminary investigation of a phenomenon and the planning processes that underpin it and on the provision of interventions iteratively to address the perceived undesirable state of affairs /anomaly. It also engages in a reflection on these practices to learn from and improve practices and evaluates the interventions based on clear assessment criteria. Thus, action research will form the basis for understanding the technology-supported knowledge management approach adopted in this study. Dzansi, Rambe and Coleman (2015) consider action research to involve a cyclical process that emphasises action, evaluation of action and continuous monitoring of the entire system. Finally, action research serves as the best fit for this study because it is anchored on close collaboration between the researcher and the practitioners, and in promoting change within organisations such as HEIs (Gray 2014).

According to Hudson et al. (2006:581), action research is a "framework for thinking systematically about what happens in social situations, implementing action for change and monitoring and evaluating the effects of the action with a view to continuing development." An approach that allows for intense reflection on, deliberate and systematic documentation of knowledge as well as and its transfer is deemed necessary since the knowledge transfer process cannot be assumed to be a simple and straightforward, transparent process involving "externalisation" of tacit research knowledge by the knowledge holder on the novice.

Action research requires a collaborative exploration of interventions and ideas within work. Here, both the novice and the expert become active participants in the research process; thus, allowing the transfer of knowledge and expertise to occur. This includes choosing what to study, designing the tools of investigation, choice of research methodologies, conduct experiments or research of subjects, and making meaning of the results. Therefore, given its focus on acting on, observing, reflecting and evaluating the interventions, action research is best suited for this investigation on knowledge management approaches in HE (see Figure 1.2).

Figure 1.2: The stages of Action Research
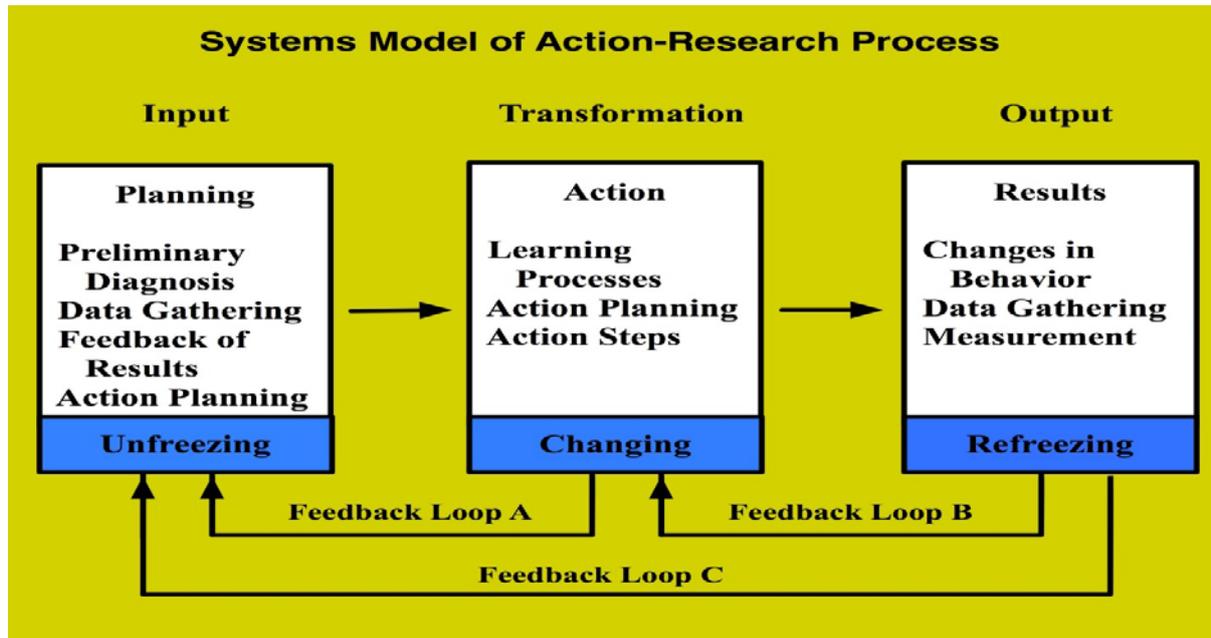
(Source: Friedman, 2008).

1.14 STUDY POPULATION

Bush et al. (2005:369) define a population as the total number of people or units for which the research data will be used to make inferences. In this study, the permanent academic staffs of the CUT on both the Bloemfontein and Welkom campuses are the target population to be investigated. Currently at the CUT's human resource database suggests that there 276 permanent academic staff at the institution. This population consists of staff members from the four faculties, which are; Engineering, Built Environment and Information Technology, Management Sciences, Health and Environmental Sciences, and Humanities. Furthermore, of the aforementioned total population, 208 staff members are Lecturers and Junior Lecturers while the remainder are Senior Lecturers, Associate and Full Professors.

1.15 SAMPLING

Sampling involves the selection of a portion of the total population to represent that population (Polit & Hungler, 1999:714). Given the qualitative nature of the study and the character of research questions posed, a non-probability sampling technique, in particular, purposive sampling (Gray, 2014: 217) best fits this investigation. The study envisages the involvement of a total sample of 48 academics, comprising 8 Associate Professors, 4 Full Professors, 16 Senior Lecturers, and 20 Lecturers. Researchers who conduct qualitative research, especially if the focus is on a distinct group of people with clearly identified common characteristics also used in this study, often prefer purposive sampling.

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1.16   DATA COLLECTION

Firstly, the study will establish, through in-depth desk research, the strategies currently in place for knowledge retention and transfer at the CUT. This will involve an in-depth examination of policy documents, faculty and departmental plans to determine the current knowledge management systems and processes that are in place at this institution.

1.16.1 Data Mining

Data mining involves the identification of valid novel, potentially useful, and understandable relationships and patterns in existing data. However, finding useful patterns in data is known by different names, such as data mining, knowledge extraction, information discovery, information harvesting, data archaeology, and data pattern processing, in different communities (Jackson, 2002:267). Statisticians, database researchers, and the MIS and business communities primarily use the term "data mining". In the context of this study, the data mining process involves the extraction of artefacts (research conversations, research approaches and research practices) generated by senior academics and junior academics during their research conversations, collaborative inquiry processes and research discussions on SharePoint.

1.16.2 In-depth semi-structured interviews

In this qualitative study, in-depth semi-structured interviews were used to collect and make sense of data (Gray, 2014) on senior academics and junior staff's knowledge management processes and practices. The researcher conducted 22 participants drawn from the Faculty of Engineering, Built Environment and Information Technology at the CUT, Free State. This faculty was considered because it was most affected by attrition of senior academics (e.g. civil, structural and electrical engineers) who left the university for greener pastures such as the corporate world where competitive salaries were guaranteed.

The semi-structured interview enabled the researcher to probe to "get to the bottom" of both the knowledge management practices in place and knowledge management gaps that still existed. Furthermore, the interview questions covered the research lessons academics had learned, their best practices of knowledge generation and retention, research repertoires they used that make them successful in research. The interviews also explored these academics' views on the potential of emerging technologies to leverage, document and transfer research knowledge of full professors especially those experts retiring in the next five years (three per faculty) at CUT.

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1.16.3 Focus group discussions

The aim of these focus groups addressed the potential loss of institutional knowledge and expertise as experienced and specialised employees retire. The researcher conducted one focus group discussion with seven staff (comprising of an Associate Professor and two Senior Lecturers) and four junior staff (comprising of two Lecturers and two Junior Lecturers). The fact that these participants were of different academic ranks and were academics from four departments ensured diversity of views, which ensured the richness of the results.

1.16.4 Document reviews

The researcher also reviewed diverse documents at CUT that related to knowledge management, human resource development and institutional strategies. The intention was to compare knowledge management practices with what was espoused in these documents. These documents formed a strong foundation regarding the vision, mission, activities and strategies which informed processes of implementation at the institution.

Document analysis was conducted to analyse data from CUT policy documents, faculty and departmental plans. The issues relating to knowledge management at this institution, including its capture, documentation and transfer were the focus of the analysis. In document analysis, the intention is to interpret documents to give voice and meaning around the content of the document (Bowen, 2009).

1.17   DATA ANALYSIS

Interview responses were transcribed verbatim. Using content analysis, the raw data was coded through identifying and refining of the important concepts, themes, categories and sub-categories in the interview transcripts.

Content analysis allows the researcher to summarise any form of content by counting various aspects of the content (Hsieh & Shannon, 2005). Overall, the researcher examined and finally drew up a hierarchy of relationships among concepts, themes, categories and sub-categories as a basis for organising and analysing the data.

Focus group discussions were analysed using narrative analysis. Narrative analysis involves outlining different meanings (or emplotments) and arguments, which are particularly relevant when using narrative as a research tool (Nayar & Stanley, 2014). For this study, therefore, the narrative analysis involved the identification of knowledge gaps in the knowledge transfer and the existing knowledge transfer practices.

1.18   ETHICAL CONSIDERATIONS

Sikes (2004:16) establishes that it is necessary for researchers to put into consideration the ethical implications of their research to mitigate negative risks, prejudices and undesirable consequences on subjects that may arise from the conduct of their research. Therefore, researchers must do everything possible to avoid harming or wronging subjects involved in the research. In view of this caveat, the researcher ensured the following: That the participants were:

- Informed of the purpose, objectives and intended academic and social benefits of the research.
- Apprised that participation was voluntary and that no financial benefits would be derived from participating.
- Advised that their identities would remain anonymous
- Advised that no psychological, physical or emotional harm would arise from participating in the study
- Informed that they could withdraw from the study without any threats or sanctions.
- Data from research reports will be reported in aggregated form to protect the individual identities of participants.

1.19   SUMMARY

The orientation chapter presented an overview of the study and highlighted the research problem. Higher education institutions are highly involved in the business of knowledge; however, they are taking responsibility of knowledge creation, sharing, transferring, storing, dissemination, and retention of highly experienced experts in the organisation through emerging technology platform even after employees have left the organisation.

The next chapter reviews the literature on the concepts of this study.

CHAPTER 2: CONCEPTUALISATION OF EMERGING TECHNOLOGIES AND KNOWLEDGE MANAGEMENT AND THEIR RELATIONSHIPS

2. INTRODUCTION

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2.2 DEFINITION OF EMERGING TECHNOLOGIES

2.2.1 CONSTITUTION AND COMPONENTS OF EMERGING TECHNOLOGIES

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2.4 RELATIONSHIP BETWEEN KNOWLEDGE MANAGEMENT AND EMERGING TECHNOLOGIES

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2.6 CONCEPTUAL FRAMEWORK ON APPLICATION OF EMERGING TECHNOLOGIES FOR KNOWLEDGE MANAGEMENT

2.7 SUMMARY OF THE CHAPTER

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2.   INTRODUCTION

The introductory chapter provided an overview of the proposed framework for optimal generation, retention and transfer of knowledge at the Central University of Technology, Free State (CUT). The model was conceived as an important bull work for preventing the loss of the research knowledge of highly experienced and aging professoriate upon retirement, transfer or resignations.

Building on the previous chapter, the current chapter explores the role of SharePoint, an instance of emerging technology, in leveraging knowledge management processes, especially the retention and transfer of knowledge from senior academics (Professors, Associate Professors and leading researchers) to emerging researchers (Lecturers and researchers) at an academic institution. Frimmer (2015) acknowledges the challenge of academic knowledge drift and warns that when employees leave the organisation, they depart with expert knowledge. Accordingly, this challenge is more acute for organisations confronted with surging retirements such as the CUT as it takes years or generations to transfer critical knowledge, which the highly experienced professoriate developed through many years of experience to a new generation of academics.

The demands for intergenerational transfer and retention of tacit knowledge is acute in knowledge-creating sectors such as higher education where senior academics are retiring, aging and exiting academia at a pace faster than their rate of replacement by less experienced and junior academics (Durst & Ferenhof, 2014; Rambe & Mlambo, 2014; Burmeister & Deller, 2016). Apart from the risk of losing expert knowledge about technical issues, there is also the risk of emerging academics losing personal social networks, which are needed for gathering information or networking with colleagues. This chapter explores the intersection between emerging technologies and knowledge management and thus, reviews literature on the composition, theorisation and implications of these concepts for the South African higher education.

2.1   DEFINITION OF KNOWLEDGE MANAGEMENT

Nawaz and Gomes (2014) state that knowledge management is a well-defined system aimed at assisting the learning process, innovation process and the sharing of knowledge to achieve the strategic goals of an organisation. In essence, the core of knowledge management is to transform individual knowledge into organisational knowledge through acquiring, sharing, storage, disseminating, exploitation and innovation of knowledge. Following the recent publication of predatory journals by the Jeffrey Bealls' (2011) Predatory Journal List and the

National Research Foundation's (NRF) Statement on Predatory Journals and Deceptive Publishers in March 2017, South African Universities, including CUT, have been pressured to rethink their knowledge production processes which include credible publishing. As the NRF Statement cautions: "The use of predatory journals and deceptive publishers compromises the creation and dissemination of rigorous scientific and scholarly work within the Digital and Open Access movement" (NRF, 2017). Therefore, knowledge management for the CUT is not essentially about the production of a publication but rather the extent of rigour in the production of the manuscript and the review process. Consistent with this argument, it can be inferred, in concurrence with the above-noted argument from the NRF Statement that, the quality of scientific knowledge produced through a rigorous process of peer review is integral to credible knowledge management.

The field of knowledge management is of great importance in the commercial and academic world because technological economies are increasingly becoming knowledge-based (Wallis, 2003; Berry, 2006; Arsenijević, Pražić, & Andevski, 2011). Yet the operation of the knowledge economy is intricately tied to effective acquisition and appropriation of emerging technologies. According to Rah, Gul and Wani (2010); Jakobsone, Motejlek and Cakula (2014) knowledge management requires technologies to support the new strategies, processes, methods, and techniques in order to better create, disseminate, share and apply the best knowledge, any time at any place, across the team and across the organisation's customers and stakeholders. Higher Education Institutions (HEIs) are knowledge-based organisations and composed of a large number of academic and support staff, departments and faculties working in a knowledge-driven environment (Baban, 2007). Thus, the knowledge workers' drawing on the collaborative and networking capabilities of technologies is fundamental to ensuring that knowledge management unfolds effectively. Technology-enhanced knowledge management also assists higher education managers in their managerial and administrative efforts of facilitating the acquisition, creation, storage, sharing, diffusion, development, and deployment of knowledge by individuals and groups (Zheng et al., 2010). The search for an effective application of technologies to support innovative processes of developing knowledge is particularly acute for the CUT. This university is still struggling to overcome academics' technikon mentality and persistently emphasises excellent teaching over advancing ground-breaking research.

2.1.1 COMPONENTS OF KNOWLEDGE MANAGEMENT

While there are many popular ways of describing the constitution of knowledge management, one more conventional and fundamental way is to conceive it as comprising *knowledge generation, knowledge retention* and *knowledge transfer*. These elements are elaborated in subsequent sections of this study.

2.1.1.1 Knowledge generation

Nonaka (1991:96) defines knowledge generation as "the continuous transfer, combination and conversion of the different types of knowledge as the users' practice, interact and learn." While Nonaka's (1991) definition emphasises knowledge production adaptation and transfer, other definitions tend to foreground its creation. Knowledge generation consists of the creation of knowledge by knowledge producers (Hemsley-Brown & Sharp, 2003:449). The confusing part is that knowledge generation tends to be conceived as embracing some of the processes of knowledge management, such as knowledge retention and transfer. Other literature emphasises five modes of knowledge generation which are the *acquisition* of knowledge that is new to the organisation (including capturing of such knowledge), the *dedication of resources, their fusion*, *adaptation* and *networking* (Malhotra, 2003; Kaur, 2015). This definition is problematic to the extent it regards networking as part of knowledge generation, even though networking tends to be concerned with the transfer of knowledge rather than its production. Nevertheless, the overriding theme that emerges from the aforementioned definitions is that knowledge generation deals with the creation of new knowledge in an organisation.

Therefore, knowledge generation, as a stage of knowledge management, comprises of activities associated with the entry of new knowledge into the system and includes knowledge development, discovery and capture (Maran, 2012). It is clear from this view that the documentation of knowledge is integral to both knowledge generation and retention. A typical type of knowledge that can be generated is tacit knowledge, which may emerge from experience acquired on the job (Greunz, 2005) from within company networks and social networks. Academic and industrial researchers may find fresh university graduates as vital conduits for disseminating the latest knowledge from academia. The context of knowledge generation in higher education, includes university research communities, professional associations and group learning communities, as well as knowledge transfer and innovation centres, and communities of practice.

2.1.1.2 Knowledge retention

According to Kirsch (2008) and Phaladi (2011:26), knowledge retention focuses on the critical knowledge that is most at risk of being lost, prioritising what is at risk based upon potential knowledge gaps and their impact on overall organisational performance, and then developing actionable plans to generate a return on investment for the organisation. The challenges of knowledge retention are driven by two forces that shape today's workforce, namely an aging population and the increasing complexity of knowledge needed in technologically advanced societies. Both forces cause an acute skills shortage (Johnston, 2005:3) in higher education,

which depends highly on specialisation in distinct disciple areas. The knowledge retention is not only an organisational phenomenon but could be a national concern. While South Africa may not have an aging population demographics such as that of China, the acquisition and effective application of emerging technologies that leverage knowledge production is only an emerging phenomenon when compared to that of other middle-income economies such as Brazil, Russia and India.

It seems there are two main reasons for South African knowledge retention challenges. The challenges are the continual mismatch between critical knowledge production skills needed on the sector and the existing skills base available in the country. The other reason is the continual drift of seasoned academics to advanced economies such as Australia, Canada and New Zealand where their critical skills are highly demanded and rewarded. As Van der Merwe (2008) suggests, an organisation can compete in the global economy if it has an innovative workforce and treats its workers' knowledge and skills as assets and sources of competitive advantage rather than just a cost to be controlled. Knowledge retention can occur through the interactions and communication based on knowledge transfer between older and retiring workers (knowledge creators) and those workers that are potential knowledge recipients. Yet the profitability of these interactions through tacit knowledge transfer depends on the level of intimacy of interactants during the face-to-face interaction and in online networked environments (Rooney, Mandeville & Kastelle, 2013).

The retention of critical research knowledge at university is a non-trivial matter in the wake of an aging workforce and in view of the central place of the university in solving society's quadruple challenges of poverty, social inequality, social deprivation and employment. For instance, Badat (2010) warns that urgent action is necessary if South Africa's efforts to transform the social composition of its scholarly workforce are to be achieved fully. The failure to take drastic action in order to preserve tacit research knowledge may compromise the quality of research. It also compromises the capacity to produce high-quality graduates and knowledge, and the ability of universities to contribute to development and democracy through a new generation of outstanding scholars committed to critical and independent scholarship and social justice (Dube & Ngulube, 2013:3). Therefore, organisations need to figure out beforehand which knowledge could undermine the organisational survival and renewal strategy when lost (DeLong, 2004) and whose knowledge might be at risk of being lost (Martins, 2011:51).

2.1.1.3 Knowledge transfer

Knowledge transfer is an area of knowledge management concerned with the movement of knowledge across the boundaries created by specialised knowledge domains (Carlie &

Rebentisch, 2003). It is associated with identifying and retaining research knowledge that already exists in the organisation, and the acquisition and application of knowledge to enhance both short-term and long-term organisational performance and sustainability (Phaladi, 2011). This points to the continual intersection and porosity of the boundaries between knowledge creation, knowledge retention and knowledge transfer. Knowledge transfer also points to the tiered layers between individuals, organisations and society. For instance, although knowledge may be considered an organisational property once it is institutionalised, it originates as an inextricably personal property before it is institutionalisation. In the same vein, Universities are expected not only to generate but also to transfer and retain knowledge in society.

It is then not coincidental that, in view of the interlacing hierarchical relationship between knowledge production at an individual, organisational and societal levels and the importance of knowledge in an organisation's competitiveness (Bussard, 2013:4), the CUT is exploring strategies and processes for the retention and transfer of knowledge from well-seasoned employees (senior academics) to the inexperienced junior academics. The CUT has indeed developed various interventions, such as Mentorship Programmes, Scholarship of Teaching and Learning (SoTL), Stars of Academe, Research and Support (SoARS) and Talent Management Strategy, for preventing knowledge loss and to transfer knowledge from senior academics to junior academics (Rambe & Mbeo, 2017). While these strategies speak to the core of knowledge production, they do not provide a clear long term strategy of knowledge retention found on the exploitation of inexpensive, ubiquitous technologies such as social media technologies and mobile technologies, which are already exploited by researchers, academics and students

Naris and Ukpere (2010:1081) summarise the challenges, which contribute to the resignation of employees in an academic institution, and these are:

- Lack of effective and timely induction and orientation that includes mentoring programmes for new academic staff;
- Poor training and development opportunities;
- Lack of career development opportunities for encouraging and developing employees who have potential;
- Lack of flexible working hours for academics so that they can balance their lifestyles;
- Academic staff are not offered non-financial rewards such as recognition of efforts through teaching awards, personal growth and extra time for research purposes; and
- Lack of an organisational or institutional culture where teamwork is fostered and open communication is promoted.

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It is clear that there is an overemphasis on environmental factors or "hygienic factors" (Herzberg, 1987), which undermine knowledge production and frustrate employees leading to their resignation and loos of knowledge to the institutions. The contribution of technology to knowledge management cannot be ignored in this age marked by the increasing prominence of technology in knowledge production, retention and transfer. Yet, the reality is that emerging technologies, such as SharePoint, continue to take a back foot in the KM discourse at the CUT. In fact, the quicker emerging technologies can be harnessed at an individual level, the better the company, the co-workers and the individual are served. Unfortunately, organisations lack good information about where their critical and tacit knowledge is, and therefore, have difficulties and making use of the information (Davenport & Prusak, 2000:40), notwithstanding the abundance of emerging technologies.

2.1.2 FACTORS AFFECTING KNOWLEDGE MANAGEMENT IN ACADEMIA

Various factors necessitate knowledge retention and transfer in academia. However, the factors that are commonly cited are improving educational practices, knowledge attrition and difficulty of extracting tacit knowledge.

2.1.2.1 Improving educational practices

Knowledge transfer is often conceived as a major concern in improving educational practices (Willmott, 1994). The reality is that new knowledge can supersede tried and test ideas as university educators and heads of departments work in a rapidly changing technical and scientific environment where critical knowledge can easily become obsolete. The improvement of educational practice demands university educators and their heads of departments to gain experiential knowledge, some of which is formally documented and shared (Johnston, 2005:2). As such, the knowledge transfer processes are critical in recruiting and retaining top performers by offering academic employees the ability to build their knowledge and skills through strategic knowledge transfer and mentoring solutions.

The challenge of improving educational practice persists partly because of the continued production of skewed knowledge at South African university campuses, which complicates democratic and equitable processes of knowledge transfer. For instance, white males still dominate the top academic ranks such as Professors, and Associate Professors, and constitute the bulk of experienced and top-rated researchers at South African universities (Badat, 2010:24) notwithstanding the strides made in addressing the gender and racial imbalances in the knowledge production processes. In addition to these skewed racial demographics, the most highly qualified, experienced and productive researchers who are experts in their chosen disciplines (i.e. professors and associate professors) at South African

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universities are above the age of 50 (Dube & Ngulube, 2013:2), which suggests the need for knowledge transfer as part of career planning. Unfortunately, this trend seems to be going on unabated (Dube & Ngulube, 2013; Badat, 2010 and Van der Walt, 2010).

The transfer of knowledge, which gives rise to improvements in educational practice, is also tied to the demonstration of knowledge and skills. According to Szulanski (2000), success in transferring and retaining tacit knowledge is enabled sharing the know-how, which is the process of demonstration, and through show-how, which involves face-to-face contact between the source and receiver. In other words, the transfer of know-how requires a process of show-how.

2.1.2.2 Knowledge attrition

Apart from improving educational practices, possibilities for knowledge attrition are another motivating factor for knowledge retention and transfer in academia. With reference to South African universities, the most highly qualified, experienced and productive researchers who are experts in their chosen disciplines are older workers above the age of 50 years (Dube & Ngulube 2013:2). Badat (2010) affirms that this is partly a consequence of the reduction in the retirement age for academic employees at the South African universities from 65 to 60 years. Dube and Ngulube (2013) further argue that the reduction of the retirement means that most senior academics at South African Universities are due to retire in the next five to ten years as most of them are already in their fifties. Therefore, there arises a need to strategically retain and transfer knowledge in the academe, if universities are to serve humanity in the wake of an aging workforce. In addition, Burmeister and Deller (2016) state that organisations are faced with challenges of keeping their best assets (knowledge) and battling to minimise the loss of important knowledge while experiencing high levels of retirees. Mangcu (2014) and Price, (2016) also highlight the severity of this need in the South African higher education, where it is considered to take approximately two decades for a doctoral graduate to be groomed into a seasoned professor/ highly experienced researcher.

The knowledge accumulated over the years can be lost through mere reorganisation or a merger with different companies (Levy, 2011). The reconstitution of the South African higher education landscape through mergers of comprehensive universities with traditional universities, including the mergers into Universities of Technology, could have triggered the drift of academics across institutions leading to knowledge loss in the process. Some employees were transferred across campuses or migrated to other universities for various reasons such as frustration with the loss of academic credibility, track record, positions of influence, discomfort with identification with formerly poor impoverished universities and strained funding opportunities, which led to knowledge loss. According to Badat (cited in

HESA, 2011:01), the overall task was to produce and retain a new generation of academics and simultaneously transform the historical and social composition of the academic staff.

Nevertheless, this problem is not peculiar to South African universities. Lom (2012) observed that Senegal would lose 60% to 70% of its academics by 2015, because of large-scale retirements at Senegal's premier university, *Université Cheikh Anta Diop* (UCAD) in Dakar. In response to the same quagmire, most South African universities have reverted to the retirement age of 65 for academic employees, even though this approach has not totally solved the problem. While there is increasing recognition of the potential loss of talent at South African universities, the challenge, however, is in the lack of a sound strategy for reducing and ultimately eliminating the damage to the academe emanating from such inevitable loss Dube and Ngulube (2013).

2.1.2.3 *Difficulty of extracting tacit knowledge*

One of the most acknowledged difficulties of knowledge transfer and retention is in extracting tacit knowledge. Unfortunately, extracting tacit knowledge from seasoned academics to make it available to novices within the organisation, is not an automatic process (Calo, 2008) due to the variability of personal traits, contexts and organisations in which knowledge transfer occurs. Thus, the transfer of knowledge depends on the individual (absorptive capacity) and organisational capabilities (systems, processes) and, even more important, on the employees' motivation to share knowledge. If there is no desire to exchange knowledge, the transfer of knowledge will grind to a halt. Therefore, knowledge retention and transfer can help organisations to reduce the danger of knowledge leakage or loss (Andersen, 2012) and address the challenge of knowledge loss in order to increase the competitive advantage of smaller institutions such as the CUT.

2.2   DEFINITION OF EMERGING TECHNOLOGIES

Emerging technologies (ETs) are defined as new or evolving technologies that can be used to enhance teaching, learning, research and creative inquiry, which consequently result in the generation of knowledge (Johnson, Smith, Willis, Levine & Haywood, 2011:3). The adoption of ETs is on the rise in the higher education sector worldwide; as a result, there is a growing consensus that (ETs) may be a panacea to the knowledge management woes, which research-based and knowledge-creating institutions encounter (Dave, Dave & Shishodia, 2012; Bozalek, Pande, Shelodkar Yavatmal & Khobragade, 2013; El Badawy, Marwan & Magdy, 2015). Emerging technologies, such as SharePoint, serves as a platform for the dissemination and management of information, which range from routine activities, tasks and information, which if properly constituted and well documented give birth to knowledge. While

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there is a broad range of emerging technologies (ETs), some of the most common instances of ETs include learning management systems, content repositories, and document storage technologies such as SharePoint.

SharePoint is an application software Microsoft developed as an end-to-end solution for managing documents. Usually, as a custom portal, it is developed to aggregate content from multiple sources into a single location (Ngai & Chan, 2005). SharePoint is a complex platform that integrates portal, collaboration, content management, business, process and business intelligence to help users easily find, use and share information and increase individual and organisational productivity. The challenge, however, is that some technologies, such as SharePoint, have not been considered as useful platforms for knowledge retention and transfer at universities as they are generally considered as new technologies that have not been tried and tested in developing countries contexts. Nonetheless, the SharePoint list is a handy tool for sharing contacts, calendar appointments, tasks, or data with team members and site visitors, and provides the underlying architecture for organising information on the academics' site.

2.2.1 CONSTITUTION AND COMPONENTS OF EMERGING TECHNOLOGIES

While the constitution of ETs is heavily contested, the general nomenclature of such technologies classifies them within those that deal with knowledge generation and with emerging technologies. These different classifications are discussed in subsequent sections of this study.

2.2.1.1 *Emerging Technologies for Knowledge Generation*

Personalised knowledge is constructed in both formal and informal personalised environments, which makes ETs, such as SharePoint, provide opportunities for generating personalised knowledge as they allow interactants to share files and data with team members or other people. The majority of these technologies (e.g. social media) were invented long after the boomers (those aged between 50 and 70) had already taken up their professions; as a result, these boomers generally hold negative perceptions, which may undermine the uptake, appropriation and implementation of these technologies (Burch & Strawderman, 2014: 70-71). In addition, the technologies that prove indispensable, even for boomers are academia sites such as Research-gate and Academia.edu, and application software that includes SharePoint), which are collaboration suites for academics to share and work on the same project in HEI (Rambe & Mbeo, 2017). Therefore, one can argue that emerging technologies, such as SharePoint, are indispensable knowledge management platforms upon which

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effective twenty-first-century researchers and academics depend on for knowledge appreciation, generation, enactment and documentation, retention and transfer.

ETs seem to be the way out from the challenged posed by knowledge losses in HEIs. The use of such technologies is on the rise in the higher education sector worldwide (Bozalek et al., 2013:3). This rise suggests that such technologies are facilitating HEIs' response to the challenge posed by knowledge losses in HEIs. In addition, Johnson et al. (2011:6) conceive ETs as technologies, which enhance teaching, learning, research or creative inquiry on university campus within the next five years. As a result, ETs such as SharePoint are instrumental in knowledge retention as they augment the institutional memory of the organisation by promoting knowledge sharing. In addition, employees can learn from past successes and failures to ensure positive results. Liebowitz (2008:3) notes, in concurrence that learning from others can help avoid going down the wrong paths or reinventing the wheel.

2.2.1.2 Emerging Technologies for Knowledge Transfer and Retention

Knowledge management requires technologies to support the new strategies, processes, methods and techniques in order to create, disseminate, share and apply the best knowledge across the organisation and its customers, partners and other key stakeholders. The key technologies are communication and collaboration technologies that use internet and intranet usage and mobile technologies (Marwick, 2001).

Geoff (2010) highlighted the following as the general use of SharePoint in the public sectors, both South Africa and outside South Africa:

- Document Management- SharePoint is ideal for managing policies and procuring documents and manuals. Companies are beginning to adopt the document management model of creation, storage, retention and expiry and SharePoint is positively strong in those areas.
- Meeting Management- Some Departments use SharePoint Meeting Templates to plan agendas, create minutes and check on follow-up actions.
- Record-Keeping- SharePoint is used to store electronic records of employees and customers or suppliers.
- Electronic Forms- Forms are used for digitising systems, such as Expense Claims, Travel Requests, Holiday Requests or Purchase Orders.
- Reporting- SharePoint is used to take data from various different data sources, such as Structured Query Language (SQL) and Oracle databases, which means that it is simple to compile reports and produce business intelligence.

- Contact Details- SharePoint is used to store information on internal or external contacts and provides a detailed user directory.

- News Distribution- SharePoint is used to share department or company news generated globally and automatically by user location.

- Surveys- SharePoint is used to give feedback from training courses or the performance of a department.

- Appointment Management- Calendars and event repositories are accessible and display weekly movements of key members of staff.

- Discussions- Discussion boards are accessible so that users can discuss on various subjects and share ideas.

- Information Searching- SharePoint uses index repositories, documents and features, to locate and retrieve company information.

- Study's Management- SharePoint can be used to track and monitor multiple studies.

- Time Management. SharePoint is used to record the time taken on single studies or to manage work streams.

2.2.2 EMERGING TECHNOLOGIES AS A LEVER FOR KNOWLEDGE MANAGEMENT

Emerging technologies, such as social networking sites, content repositories, learning management systems and virtual games, are making a huge impact on society. Existing research notes that ETs are contributing to the digitisation of knowledge creation processes, changing the structure of knowledge management processes, improving the efficiency and effectiveness of knowledge work processes, improving access to information at tweak speed, and increasing the competitive advantage of research institutions (Gates, 1999; Rotman, 2013; El Badawy et al., 2015). In spite of this acknowledgement of ETs' capacity to foster knowledge management, the actual impact of such technologies on knowledge transfer and retention is yet to be fully understood and realised.

Knowledge management first involves identifying (or locating) and capturing knowledge. Once the knowledge is captured (including tacit knowledge, which deals with what is in the heads of individuals, and explicit knowledge, which can be easily codified), the knowledge can be shared with others using SharePoint. Then, individuals will apply this shared knowledge and internalise it using their own perspectives. This may produce new knowledge, which then needs to be captured, and the cycle starts over again. Knowledge management research has highlighted the need for knowledge generation, transfer and retention, and proactive measures that must be instituted to address the potential acute shortages of research leadership in higher education in general and in South Africa (SA) in particular (Levine, 2008;

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Carman, Leland, & Wilson, 2010; Robinson, Carrillo, Anumba, & Patel, 2010; McNair, Duree & Ebbers, 2011; Rambe & Mbeo, 2017).

The shortage of research leadership (such as professors and senior academic staff) in higher education could be a consequence of early retirement or outsourcing (Thomas, 2009:1), transfers of current leaders (senior academic staff) and absence of mature academics and researchers who should fill the vacated positions is very disturbing (Joshi et al., 2010; Linder & Wald 2011). To the extent that the nascent research culture at CUT may compel senior management (e.g. Heads of Department, Deans, Directors of Research and Deputy Vice-Chancellor: Research, Innovation and Engagement) to emphasise the increase in research outputs (e.g. articles, conference proceedings and books) at the expense of quality (e.g. publication in leading, high impact journals, securing NRF rating for staff, and SARCHI chairs), the challenges of creating cutting edge research and knowledge management may persist into the future. According to Ibrahim *et al.* (2006:19), a culture that promotes open sharing of knowledge can be realised if leaders clearly articulate the value of the knowledge management initiative, attract support at all levels, reward proper behavior, and encourage employee interaction.

2.3   NONAKA AND TAKEUCHI'S THEORY OF ORGANISATIONAL KNOWLEDGE CREATION

There is need to conceive the way Share Point application supports knowledge retention and transfer d in light of Nonaka and Takeuchi's (1995) Theory of Organisational Knowledge Creation. The theory defines organisational knowledge creation as "…the capability of a company as a whole to create new knowledge, disseminate it throughout the organisation, and embody it in products, services and systems." However, since knowledge creation in university faculties unfolds in silos (e.g. departmental knowledge and programme based knowledge), the company-wide creation of knowledge is hard to attain. Perhaps, Share Point could provide a platform for institution-wide dissemination of knowledge through its features such as bringing together data (data about staff, about students, about research publications) kept on different systems in the University. Share Point could also improve cross-school/departmental working as site owners can allow colleagues access to sites from anywhere within the institution without having to go through an IT administrator. Nonaka and Takeuchi (1995) argue that knowledge is initially created by individuals, and such knowledge becomes organisational knowledge through the process described in Figure 2.1. In the context of tacit knowledge generated by academics within the university, this means SharePoint Team sites enable groups of colleagues to capture, develop and share documents and information and also provide permanent storage of the acquired knowledge. The focus of the current

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study is not on organisational knowledge per se but rather on how tacit research knowledge can be transferred from senior experienced research academics to junior staff as well as its retention among such staff.

2.3.1 Theory of organisational knowledge creation

The Theory of Organisational Knowledge Creation postulates two dimensions of organisational knowledge creation, which are epistemological and ontological. On the epistemological level, the authors recognise two types of knowledge-tacit and explicit. Explicit knowledge is the knowledge that can be written down and is easily transferred from one person to the next (DeLong, 2004:27). Senior researchers may communicate disciplinary content and subject matter such as constructs and concepts through transmission processes such as direct teaching, mentoring, and coaching. On the contrary, tacit knowledge is more difficult to articulate because it is often embedded in individual experiences. According to Nonaka and Takeuchi (1995), such knowledge may be assimilated through junior researchers' imitation of the research repertoires of seasoned researchers and close reading of their informal writings in informal spaces (e.g. blogs and wikis) to interpret and make inferences about such writings.

The ontological dimension ranges from the individual level to team, group, organisation level and beyond. The current study is preoccupied with knowledge retention and transfer than unfolds between the experienced knower (that is, seasoned academics and researchers) and the research novices (that is, junior researchers) at CUT. Regarding the knowledge generation and transfer process, Nonaka and Takeuchi (1995) further assert that a spiral emerges when the interaction between tacit and explicit knowledge is elevated dynamically from a lower ontological level to higher levels. The four modes of knowledge conversion create a spiral through which knowledge is transformed from one type to another. These modes include socialisation (from tacit to tacit knowledge), externalisation (from tacit to explicit knowledge), combination (from explicit to explicit knowledge), and internalisation (from explicit to tacit knowledge).

Figure 2.1: Knowledge Spiral on Epistemological Level
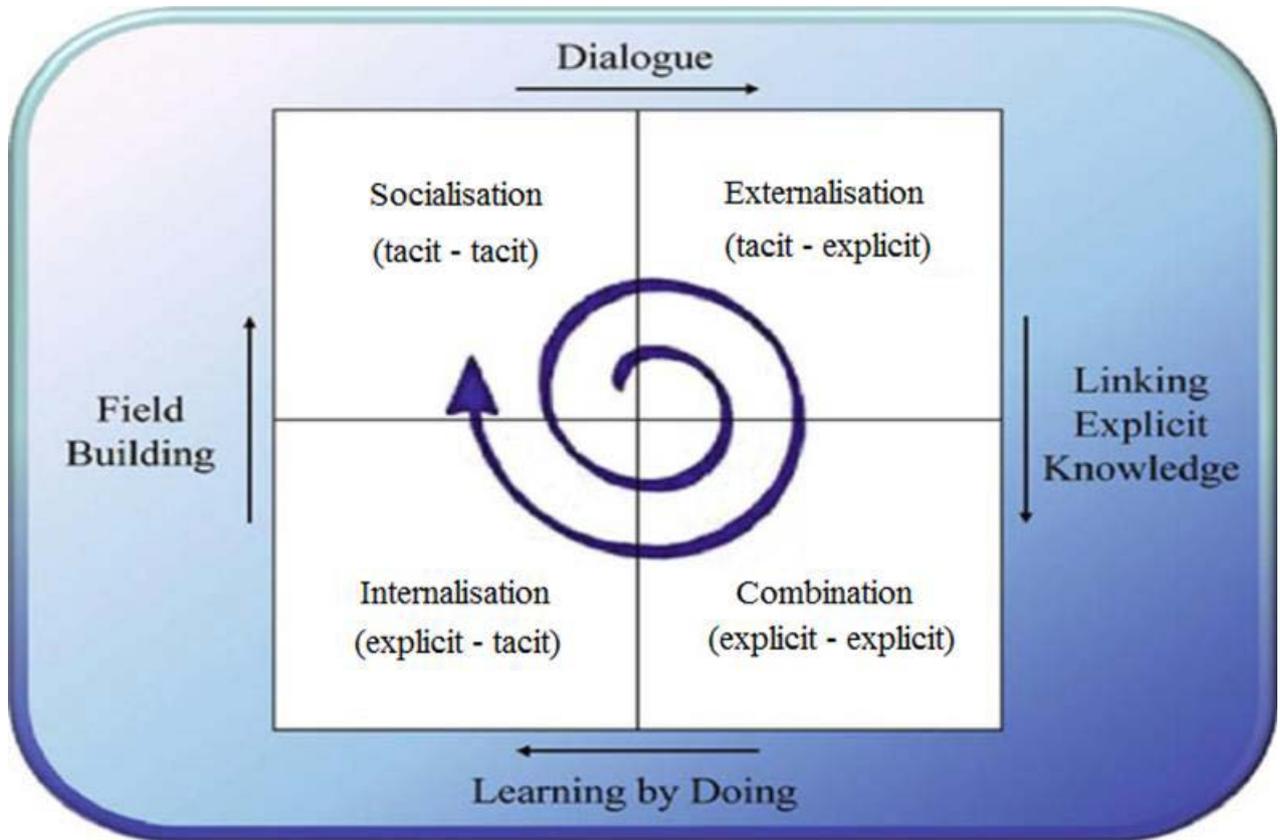
(Source: Wilde, 2011)

Nonaka and Takeuchi (1995) draw extensively on the existing body of knowledge on organisational knowledge creation and a collection of case studies of multiple Japanese organisations to develop their theory on generating and distributing knowledge within a company. Figure 2.1 summarises the knowledge creation and retention process. Thus, from a process perspective, knowledge creation and retention process in organisations entail the following (Kaur, 2015):

2.3.1.1 Socialisation (Tacit to Tacit):

Socialisation is the process of converting an individual's tacit knowledge into social interactions by sharing one's feelings, emotions, experiences and mental model with others in the organisation. The individuals may be both workers of the same department or organisation or employee, customer and supplier interactions.

From *tacit to tacit:* occurs when an experienced researcher exchanges knowledge with a novice in a face to face communication. Examples are a personal dialogue or a conference, but also 'exchange of experience' through observation or imitation. Junior academics can be socialised into leading research productivity through informal conversations with senior

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academics on important subjects in their disciplinary fields or through accessing the informal writing of senior academics in informal spaces such as their personal blogs, observations, and virtual learning communities.

2.3.1.2 Externalisation (Tacit to Explicit):

Externalisation is an individual process through which the tacit knowledge, gained from socialisation, is transformed into explicit knowledge, thus allowing it to be shared, disseminated and transferred to others in the organisation. This is done through the use of ideas, images, and concepts, figurative and visual language. The efficiency of this process depends on the level of education and motivation.

From *tacit to explicit*: generating new knowledge by combining existing knowledge. For instance, an organisation's director of finance collects financial information from different parts of the organisation to produce financial reports. In the higher education sector, externalisation processes can take the form of junior management's engagement with senior academics' personal experiences through discussion on their personal lives and case studies of their lives. Alternatively, such as process could involve the use of lay literature (e.g. online materials, and anecdotes from newspapers) in preparation of scholarly papers to deliver at seminars, inaugural lectures, keynote addresses and the direct mentoring of junior staff informal learning spaces.

2.3.1.3 Combination (Explicit to Explicit):

The combination is a social process in which explicit knowledge is collected, combined and edited from Externalisation and then processed to form new knowledge, using documents and databases. Then the new explicit knowledge is disseminated among various employees of the organisation to make it more usable. The success of this process is based on the communication and diffusion processes of explicit knowledge and the efficient use of computerisation and systemisation.

From *implicit to explicit*: This refers to the development of experiences, opinions, comments so that others can use them. This form of knowledge exchange is supported through documents, Personal Computers (PCs), networks and communication tools. Here new knowledge is spread among the organisational members. The dissemination of explicit knowledge is based on the process of transferring this form of knowledge directly by using presentations or meetings. The editing or processing of explicit knowledge makes it more usable (e.g. documents such as departmental plans, reports, student assessment manuals and generating students and staff data). The combination of knowledge forms may arise from formal modes of knowledge delivery such as (1) a senior academic's use of a lecture to teach

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the concepts s/he wrote in her scholarly book or article, and (2) demonstration of a clinical procedure drawing on established/ conventional standard operating procedure.

2.3.1.4 Internalisation (Explicit to Tacit):

Internalisation is a learning process that is linked to 'learning by doing'. The formation of an own opinion is an example. The explicit knowledge becomes part of the individual's knowledge base and thus an asset for the organisation. It reflects the transformation of explicit knowledge into tacit knowledge through continuous individual and collective interactions. In this process, the old explicit concepts obtained from Combination are updated, expanded, extended, transformed and then shared by the individuals of the organisation in their own tacit knowledge, according to their own styles and experiences, thus, starting a new cycle again. From *explicit to implicit*: explicit knowledge occurs when it is internalised in staff and results in the development of their own knowledge. Internalisation may involve drawing on a seasoned academic's constructs or concepts (explicit knowledge) to write up a concept paper (tacit knowledge) or a non-scholarly article.

The above forms of knowledge development are restricted in their use to the generation of new knowledge. Tacit and explicit knowledge must interact dynamically. Therefore, the Nonaka and Takeuchi (1995) SECI model highlight organisational learning as a social process. It also indicates the need to convert different types of knowledge in a cyclical way to create competitive advantage. Essentially, organisational learning involves a recurring set of activities to change one type of knowledge, for example, tacit knowledge to explicit knowledge and vice versa. However, some processes such as externalisation and combination favour explicit knowledge while others like socialisation and internalisation favour tacit knowledge. Those processes that favour tacit knowledge tend to share the characteristics of informal knowledge processes; that is, they are spontaneous and voluntary in nature.

2.4   RELATIONSHIP BETWEEN KNOWLEDGE MANAGEMENT AND EMERGING TECHNOLOGIES

Knowledge management is one method for ensuring that years of accumulated wisdom do not leave the organisation once the employee retires and moves on (Ramohlale, 2014). According to Dave, Dave, and Shishodia (2012), knowledge management is a multidisciplinary paradigm, which uses technology to support the generation, retention and transfer of knowledge in the context of specific organisational processes. Since higher education institutions (HEIs) are considered to be knowledge intensive organisations (Ramachandran, Chong & Wong, 2013), the challenge is to create an atmosphere that fosters

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knowledge sharing, while simultaneously underscoring that transferring knowledge is a way that allows employees to leave a knowledge base that will sustain the organisation long after they leave. As such, many companies have endorsed knowledge management as a resource for organisational survival. According to Kumpirarusk (2012:54), knowledge management ensures that the organisation shows the best performance and stand in a good competitive position with its competitors. Most of the companies have accepted knowledge management and identified it as a resource.

While the decreasing cost and the concomitant increased availability of ETs are creating new possibilities for the transformation of pedagogical and social practices in higher education (Bozalek, Gachago & Watters, 2015), good examples of ET use for knowledge transfer and retention remain speculative and under-explored in mainstream management literature. The New Media Consortium (Johnson et al., 2011) examined the view of experts in an effort to understand how emerging technologies would impact on creative inquiry (an example of knowledge management) in a variety of Latin American Higher Educational Institutions. One of its key findings that resonate with knowledge management is that most academics are not using new and compelling technologies for organising their own research, and metrics of evaluating their research lagged behind new scholarly forms of research, authorship, and publishing (Johnson et al., 2011). The under-researched nature of ETs for knowledge management creates fissures in our in-depth understanding of the processes critical and is relevant to knowledge transfer and retention.

2.5 IMPLICATIONS OF EMERGING TECHNOLOGIES FOR KNOWLEDGE MANAGEMENT

The integration of the Nonaka and Takeuchi (1995) theorisation about knowledge creation into Share Point-based knowledge production requires a clear identification of relevant knowledge creation drawing on this technology. These knowledge production stages, summarised in subsequent sections, are the knowledge appreciation stage, creation, sharing, transfer and retention.

2.5.1 Knowledge appreciation

Knowledge creation, according to the Nonaka's SECI model, is about the continuous transfer, combination, and conversion of the different types of knowledge, as users practise, interact, and learn. Beyond this, knowledge creation is also supported by relevant information and data, which can improve decisions and serve as building blocks in the creation of new knowledge. The ability to create new knowledge is often at the heart of the organisation's competitive advantage. Organisational knowledge creation is the process of making available and

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amplifying knowledge created by individuals as well as crystallising and connecting it to an organisation's knowledge system. In other words, what individuals come to know in their (work-) life benefits their colleagues and, eventually, the larger organisation.

Knowledge appreciation demands epistemological access, which is not just about possessing the knowledge but knowing how to make it (i.e. the values, attitudes and practices that go into its making) (Rambe & Mawere, 2011; Boughey, 2014). The knowledge appreciation stage demands expertise-in-context, which entails the articulation of non-deliberative behaviour along with its non-conceptual and embodied character (Boyd & Addis, 2011). Since the knowledge appreciation stage sets the tone for the articulation of tacit knowledge conveyed through research insights, hunches and difficult-to-communicate research repertoires. As a result, the seasoned researcher's articulation ability and the novice's appreciation of such tacit knowledge are key to the effective socialisation of the novice into the knowledge management process. Once people with the appropriate knowledge have been identified, they must be able to convey that knowledge, as tacit knowledge cannot be captured if it remains in the head of the knower (Esterhuizen, Schutte & Du Toit, 2012).

Therefore, seasoned research practitioners may rely on craft knowledge to solve complex problems. However, these seasoned researchers need important communication skills to articulate such knowledge just as the novice should not simply accumulate the knowledge but have an appreciation of how it is used in the framing and reframing of real-life problems and testing out of real solutions (Calderhead & Shorrock, 2005; Rambe & Mawere, 2011).

2.5.2   Knowledge creation

Awad and Ghaziri (2010: 98) state that new knowledge creation is – based on ongoing experiences in a particular problem area and then using that knowledge in combination with the initial knowledge to come up with updated knowledge to stay competitive. According to Awad and Ghaziri (2004), leaders acquire their knowledge of problem areas through ongoing experience. Some portion of that knowledge could be preserved by explicit means, and some critical portion may exist as inexpressible tacit knowledge. Succession plans that do not offer the experiences necessary to reproduce this ineffable tacit knowledge could fail to provide updatable knowledge. Failure to produce this knowledge in successors may take a heavy toll on organisational competitiveness under the charge of a successor.

Therefore, knowledge creation requires the knower to possess information sourcing and synthesis abilities to ensure seamless integration and conversion of information into knowledge. Knowledge creation also depends on the enactment, documentation and retrievability of the tacit knowledge. The usability, accessibility and familiarity of low cost,

ubiquitous, threshold technologies such as SharePoint to the novice and the experienced researcher are also pivotal to knowledge creation and overcoming of organisational amnesia.

2.5.3 Knowledge sharing

The "sharing" may be face-to-face, across the distance with electronic technology, or across time with access to information archived by others. Knowledge sharing demands mutual trust and open communication between experienced researchers and novices. Trust and open lines of communication are closely related to fostering strong personal relationships (Argote & Ingram, 2000; Esterhuizen et al., 2012). Mutual trust implies that the novices believe in the capacity of the knowledgeable knower to articulate knowledge, while the knowledgeable knower also holds the conviction that the potential knower (novice) will critically and genuinely apply the knowledge s/he (the knowledgeable knower) has articulated. This means that the research expert should give the novice the 'benefit of the doubt' that he/she will demonstrate research integrity (e.g. through proper acknowledgement of the expert's work and desisting from plagiarism) and an ability to become a research authority in his or her own right.

However, mutual trust also depends on the existence of shared practice and understanding of the domain in which knowledge is shared and exchanged (Wenger 1998, 2004; Rambe & Mlambo, 2014). The Faculty of Engineering, Built Environment and Information Technology at CUT, has an Engineering Team Site whereby SharePoint is adopted as a platform to share knowledge via documents of different committees among different departments. SharePoint acts as an intranet for internal usage in this faculty, with access granted to staff by their membership in the committee and the level of security. SharePoint also links up with SharePoint Blog (S Blog), by storing those documents of the postings created in SharePoint blog to quickly share ideas and information in an informal way. As a result, staff can easily access the document by simply clicking the hyperlink in S Blog.

2.5.4 Knowledge transfer

The transfer of research knowledge demands the senior academic/researcher to desist from hiding knowledge and instead increase the levels of knowledge accessible to the novices. The journey to the externalisation of knowledge should support a culture that prohibits knowledge hiding within and beyond the organisation (Esterhuizen et al., 2012) by providing a formal incentive mechanism for staff who participate actively in knowledge transfer. If tacit knowledge remains unspoken and hidden (McInerney, 2002), such knowledge which emerges from the assumptions and expertise of individuals that develop over the years, may never be documented or recorded (Martins & Martins, 2011). The transfer of knowledge also demands alignment of the technology in use, the transfer strategy of the individuals effecting such

transfer. Therefore, co-operating individuals should draw on available, low-cost technologies such as SharePoint, to develop an effective knowledge transfer strategy that draws on context-relevant content in situated learning environments. Furthermore, SharePoint is used for those who want more flexibility, more collaboration, and those who aspire for the possibility of having different levels of user permissions and contributions. Those of us who prefer SharePoint are colleagues engaged in organising research groups or teach ones-off tutorials (Eisenbeiss, 2009).

2.5.5 Knowledge retention

Knowledge retention is the result of a successful knowledge transfer between older and retiring workers and those employees who remain within the organisation (Ropes, 2013). Knowledge retention requires not only organisational learning, effective career succession planning but also the re-hiring of senior academics who have already retired. The development of intergenerational teams, in organisational learning, may foster the reciprocal transfer of knowledge and enable less-experienced workers to function as catalysts in unlocking the knowledge base of experienced workers (Tempest, 2003; Burmeister & Deller, 2016). Ropes (2014) identifies age-diverse teams as one of the effective mechanisms for advancing intergenerational learning. In academic settings, this may take the form of using a list on SharePoint site where experienced senior staff can share information with other team members and site visitors working on the same project in HEI.

Other major factors for engaging in knowledge management include knowledge retention. Knowledge retention can be increased by capturing key knowledge before experts retire, resign or leave the firm and in that way, build the institutional memory or knowledge base via knowledge management efforts. Communities of practices in which people have shared trusts, beliefs, and values constitute components of knowledge management programs that give people a sense of belonging and allow lessons learned to be shared. Thus, staff retention should be increased because employee morale will be enhanced through collaboration and bonding among those communities of practice.

According to Rambe and Mlambo (2014), Community of Practices (CoP) describes a group of people who share a concern or a passion for something they do and learn how to do it better as they interact regularly. Considering the potential of ETs as a platform for retention and transfer of knowledge, the participation of senior academics and novice researchers in academic CoPs provides good leverage for the conversion of knowledge to the new generation of workforce in the HEIs. Research novices' (postgraduates) mutual engagement in joint activities, collective problem solving, sharing of experiences about complex research processes including hunches on possible research alternatives all constitute engagements in

a CoP. Therefore, CoP embodies social structures that focus on knowledge and enables knowledge management to be placed in the hands of practitioners (Wenger, 2004).

2.6   CONCEPTUAL FRAMEWORK

An ET such as SharePoint is a useful collaborative knowledge creation and sharing tool for senior academics at the CUT, an institution under pressure to retain and transfer its research knowledge to emerging academics, amid the aging, retirement and exiting of its experienced academics. SharePoint has the potential to grow the institutional memory of the organisation through its provisions of:

- A platform for experienced academics' generation and storage of content and knowledge (that is, a *knowledge repository*).
- Interactive interfaces that allow for novices' individual reflection and senior researchers-novice's collaborative interaction (that is, *meaningful engagement*).
- Textual archives that retain trails of previous conversations between research experts and expert-novices, which other novices can access in future to augment their memory (that is, *digital footprints*).
- Open learning of novices in a connected individual environment (that is, a *personal learning environment*).

SharePoint serves as an effective platform for enhancing knowledge transfer and retention by providing a connected interactive environment that allows for individual reflection and collaborative networking of research processes between experienced researchers and novices. In this manner, novices can learn from past successes and failures of experts to ensure positive results. Learning from experts could help novices avoid going down the wrong paths or reinventing the wheel (Liebowitz, 2011).

The study intends to investigate the feasibility of a knowledge management (KM) model for the retention and transfer of tacit research knowledge from senior academics to junior academics at CUT. As a result, the study argues that SharePoint enables six knowledge creation processes namely *knowledge appreciation, knowledge enactment and documentation* (i.e. knowledge creation), *knowledge sharing, knowledge transfer* and *retention* (See Figure 2.2 below).

Figure 2.2: ETs enhanced model for knowledge generation, transfer and retention
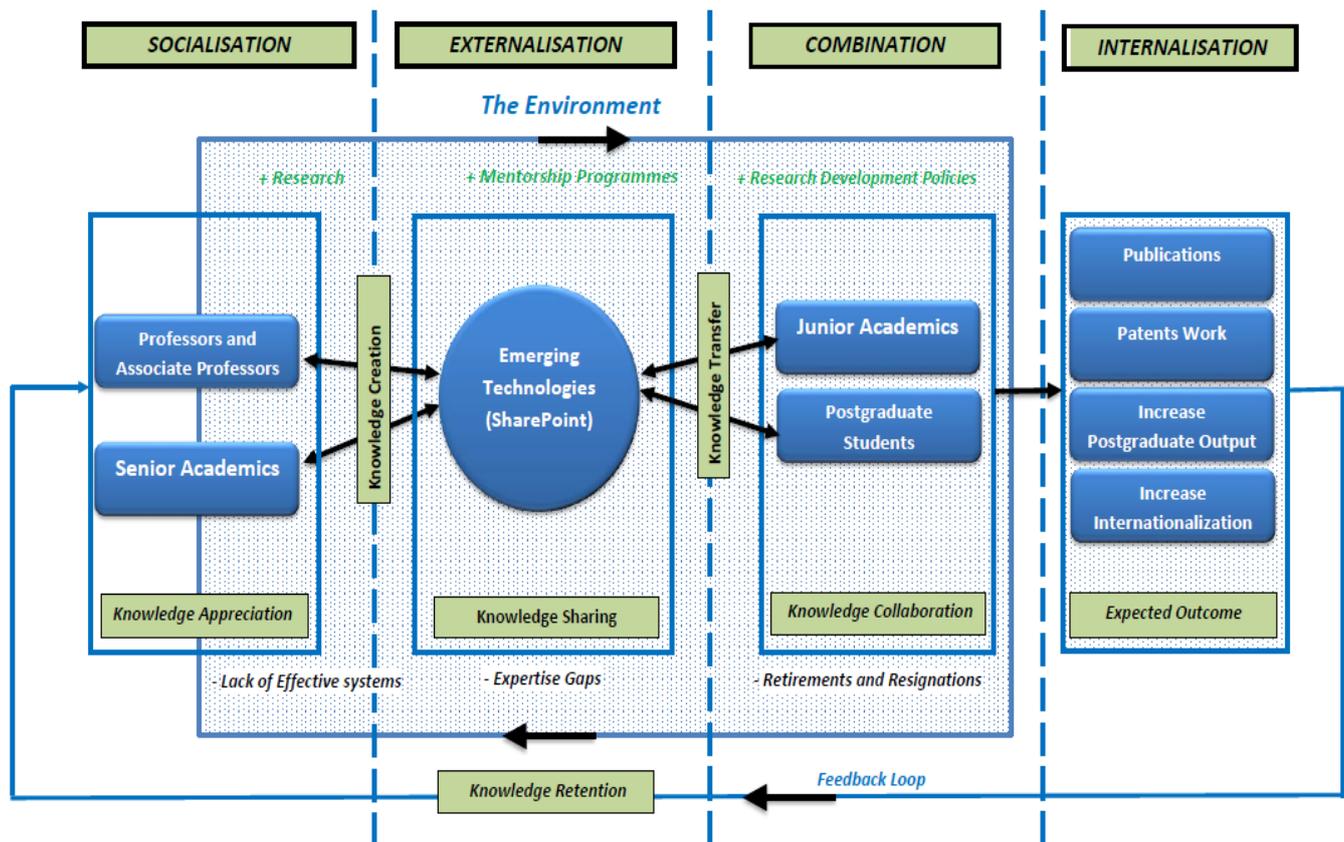
(Source: Author's compilation)

2.6.1 Knowledge appreciation

Knowledge appreciation stage is an equivalent of the Nonaka and Takeuchi's (1995) socialisation stage where there is a conversion of knowledge from tacit to tacit. In this stage, a seasoned researcher may create his/her personal internal or external blog where s/he experiments with his/her fuzzy, unrefined ideas, develop new insights and deploy them as a trigger for high-level thinking and deep learning. A typical example of knowledge appreciation is that Steven Downes and George Siemens employed personal blogs to explore and experiment with formative ideas leading to the formulation of Connectivism theory. A blog can be live-streamed and integrated into the SharePoint platform for easy accessibility by colleagues. A personal blog acting as an external tool that is plugged into the university's SharePoint platform or university website becomes an excellent tool for thought leadership positioning (Pande et al., 2013). It is at this stage that a clear definition of roles and responsibilities in the knowledge management becomes critical to both the experienced researcher and novice's fulfilment of their duties.

2.6.2 Knowledge creation

*Knowledge creatio*n involves enactment, negotiation, documentation of knowledge or conversion of information into knowledge. In this stage, organisational memory is formed by refining, organising, and storing knowledge using structured content repositories and data warehouses (Pande et al., 2013). In SharePoint, senior academics can create knowledge through 'crowdsourcing' and synthesis of ideas from various literature, the development of scholarly manuscripts and their archiving in this platform. Senior academics can also generate knowledge through collaborative authorship with their experienced peers or with their novice researchers as research assistants. This stage can be conceived as the first phase of the Nonaka and Takeuchi's (1995) knowledge externalisation process (see Nonaka & Toyama, 2007) whereby externalisation is an individual process through which the tacit knowledge, gained from Socialisation, is transformed into explicit knowledge, thus allowing it to be shared, disseminated and transferred to others in the organisation. Knowledge externalisation process is done through the use of ideas, images, and concepts, figurative and visual language. The efficiency of this process depends on the level of education and motivation.

2.6.3 Knowledge sharing

Knowledge sharing may take different forms such as the exchange of explicit knowledge through formal presentations such as lectures, seminars and workshops. Alternatively, it may involve the sharing of uncodified research experiences, repertoires and social practices, which triggers the externalisation of tacit research knowledge. This highly personal and hard to formalise research knowledge comprises insights, hunches and intuitions (Dave et al., 2012), which senior academics may possess but find it hard to communicate to junior academics. Senior academics' informal offline conversations with novice academics may also provide the platforms through which such knowledge can be negotiated and shared collaboratively. This is an externalisation of knowledge (Nonaka & Takeuchi, 1995) may also involve junior academics' critical commentary of senior academics' draft manuscripts, work in progress, working papers and position papers via SharePoint features which emphasise document management, collaboration engagement and argument development. Knowledge sharing may also take the form of social bookmarking where both senior and junior researchers save the links of relevant web resources they want to share or access in future. Overall, a combination of knowledge creation and sharing constitutes the knowledge externalisation process (Nonaka et al., 1994; Rambe & Mbeo, 2017).

2.6.4 Knowledge transfer

Knowledge transfer involves the extraction of knowledge from the knowledgeable knower (or experienced researcher) to the potential knower (or novice researcher) through various processes such as co-construction of knowledge, scaffolding processes, direct instruction and mentoring. It relates to the sharing or communicating of knowledge (Szulanski, 1996; Wang & Noe, 2010) through processes such as social interaction and intimate communication (Burmeister & Rooney, 2015). To the extent that knowledge transfer in research knowledge production processes happens among potentially different generations and age groups, it may unfold in SharePoint through mentoring, narrating case studies and interactive digital storytelling by the experienced researchers. The knowledge transfer processes can also take practical forms such as division of labour in the write up of draft manuscripts, simulations of article writing and knowledge sharing processes in critical reading groups. The process of knowledge transfer demands a culture that prohibits or minimises hiding knowledge internal and external to the organisation and ensures unrestricted access to information (Esterhuizen, Schutte & Du Toit, 2012). Institutions may also provide incentives for experienced researchers who participate actively in the knowledge transfer. Collectively, the knowledge transfer and collaboration phrases depicted in Figure 2.1 will form the knowledge combination phrase of Nonaka and Takeuchi's model (Nonaka et al., 1995).

2.6.5 Knowledge retention

Knowledge retention emphasises knowledge management practices and processes designed to preserve [senior] or older workers' valuable organisational knowledge before they retire (Burmeister & Rooney, 2015). The preservation of knowledge is intractably connected to the transfer of knowledge without which such preservation is untenable. At the core of knowledge, retention is the transfer or exchange part (the responsibility of the knowledgeable knower) as well as authentic learning, de-learning and re-learning, which are precisely the responsibility of the potential knower (that is, the novice). As Rule (2006) suggests, the main dynamics of authentic learning are (1) encountering (close approximations of) real-world problems, (2) using higher-order thinking skills, (3) communicating between members of a community of learners, and (4) empowering novices to choose their own learning pathways. In the context of SharePoint, authentic learning processes may take deliberative, transactive and collaborative characters.

On the one hand, deliberative engagement may involve Socratic dialogues where experienced knowers and novices engage in debates requiring deep thinking and critical questioning of concepts and issues. Such engagement lies at the level of conception of research ideas and their application in context. On the other hand, the transactive part may involve team building

and group work that give rise to draft manuscripts while the collaborative component captures taking collective responsibility for the final drafts, responding to reviewer comments and finalising the drafts.

2.6.5.1 Internalisation

The conversion of explicit knowledge into tacit knowledge, which is referred to as internalisation, is closely related to 'learning by doing' (Nonaka & Takeuchi, 1995). The approach/ model, as depicted in Figure 2.2, illustrates the environment (academe world), where senior academics interact with the junior academics and postgraduates. In this environment, knowledge is generated first and transferred afterwards, notwithstanding the various obstacles that stand in the way of knowledge transfer. Some of these obstacles in the environment can be addressed by the effective utilisation of emerging technologies. Overall, the activities in knowledge creation environment, which involve; knowledge appreciation, creation, sharing, transfer and retention, are expected to yield various outcomes already indicated in the previous subsections of this study. Created explicit knowledge is shared throughout an enterprise and converted into tacit knowledge by individuals as they embody it (Nonaka and Takeuchi 1995). It is through the process of novices' internalisation of research knowledge, research repertoires and hunches that knowledge retention unfolds.

2.7   OBSTACLES TO KNOWLEDGE TRANSFER

It is worth noting that universities generally face challenges from different fronts that impact negatively or positively on their financial standing (Van der Merwe, 2008), which has a direct impact on academic excellence.

For instance, Niebuhr (2000: 30) quotes the following five challenges that universities are likely to face:

First, timing - top management must be committed, as many organisations might not have the time or resources to make knowledge transfer succeed, given the constraints of staff reductions and budgetary challenges. Second, power play within any organisation is seen as the biggest obstacle to a free flow of information - which makes knowledge management untenable. Third, organisational structure - formal hierarchical structures or independent business units holding on to information that 'belongs' to them, may hamper the process of sharing information. Fourth, risks to an individual - such as loss of competitive advantage over peers, may heighten the proclivity to hoard information rather than share it with colleagues. Likewise, the use of tacit knowledge of experienced experts may pose risks to an individual, such as the expert's provision of incomplete information or the expert a questionable track record. Lastly, competition for students, financial constraints, political interference, academic

credibility of experts and researchers, low throughput rates, low research output, and pressure arising from attempts at meeting institutional, local, national and international imperatives and market expectations.

As one can deduce, most of these challenges are worsened by the lack of intellectual capital and academic capabilities that are critical competencies for academic and research excellence, innovation and leadership.

2.8   SUMMARY

This chapter concludes that knowledge transfer and retention are critical to the effective management of tacit research knowledge and increased research productivity of the university.   Identifying with Mohayidin, Azirawani, Kamaruddin, & Margono, (2007), the unspoken and undocumented tacit knowledge is the most valuable strategic asset of Universities of Technologies, young universities with a limited tradition of high profile, scholarly research. The study also argues that since tacit knowledge is inexorably difficult to articulate, inexpensive, ubiquitous digital platforms such as SharePoint, where senior academics and young academics congregate and deliberate on research matters, may serve as useful arenas for the externalisation of tacit research knowledge.

The literature review has shown that the use of ETs is a lever for educational purposes as much as it is an engagement medium for senior academics, emerging researchers land to their students. These successes, however, are not without shortcomings. Furthermore, the literature review indicated that there are various factors which may influence the acceptance of this model (ET model). Thus, considering the scope of this study and the major key players involved; which are the boomers (the senior academia between age 50 and 70) and the gamers (the fresher academia), there is a higher risk that the boomers may not be using much of emerging technologies for research. Nevertheless, as a University of Technology that is mandated to champion and be a prime trailblazer in the adoption and effective utilisation for the business of teaching, learning and research, we envisage that while the boomers may be technology laggards, their use of an action research approach to this technology-oriented investigation may improve the intention to and ultimate uptake of emerging technologies for research (Aziz & Abdullah, 2014; Rambe & Mbeo, 2017).

Mindful of the inter-generational knowledge and technology exposure gaps between aging academics (Professors and Senior Researchers) and novice researchers, collaborative academic engagements in traditional web-based technologies which both groups are familiar with and exposed to (e.g. blogs, wikis) could serve as a springboard for the use of SharePoint. The researcher proposed the seamless integration of these technologies through tools such

as notifications, Really Simple Syndication (RSS) feeds and other content aggregators. Finally, the appropriate integration of appropriate knowledge transfer and retention strategies, dedicated academic groups and appropriate, low cost, and low threshold technologies would guarantee effective transfer of tacit research knowledge from experienced academics to novice researchers.

Chapter 3 outlines the research design and methodology, and methods of data collection comprising of interviews, focus groups and observations. The chapter also considers the sampling techniques and data analysis methods used in this study.

CHAPTER 3: RESEARCH METHODOLOGY

3.1   INTRODUCTION

Chapter Two of this study discussed the role of SharePoint, an instance of emerging technology, in leveraging knowledge management processes, especially the retention and transfer of knowledge from senior academics (professors, associate professors and established or leading researchers) to emerging academics (lecturers, junior lecturers and novice researchers) at an academic institution.   This chapter engages in a theoretical discussion on the research methodology, details of the interpretive paradigm and justification for the use of a qualitative research approach and action research design applied in this study.

3.1.1 Research Methodology

A research methodology defines the systematic scientific procedures used to arrive at the results and findings of a study against which claims for knowledge are evaluated (Saunders, Lewis & Thornhill, 2007). The research methodology consists of a road map which highlights the rules and proposes methods that researchers employ to render their work open to analysis, critique, replication, repetition, and/or adaptation and to choose research methods. This chapter also describes the various procedures and processes that were employed to collect and analyse the data, adherence to ethical considerations and the population as well as sampling procedures used for the study. Data collection instruments that were used, together with an explanation of why they were deemed appropriate, are also discussed. Similarly, the chapter also discusses the procedures used to analyse data.

Data collected were indexed into specific categories, which Seidel (1998:3) refers to as the sorting component of data analysis; the putting together of the —pieces of a puzzle. Following this, the researcher reorganised the data under different themes. Once categorisation was complete, the researcher examined the categories to understand the data and relevant categories and themes. Various themes and categories emerged. The different segments of data were placed in a tabulated format. Kantner, Sova and Anschuetz (2005:5) state that data tables are optimal for studies with fewer than 12 participants and are also best suited for studies that investigate high-level questions or perceptions. Representing data in this way also avoids a biased selection of data.

3.2   RESEARCH EPISTEMOLOGY

An epistemological approach captures the way knowledge is constructed, articulated and communicated to fellow human beings. Epistemology is the philosophy on how we come to acquire knowledge and the beliefs on the way to generate, understand and use the knowledge

that is deemed to be acceptable and valid (Wahyuni, 2012). This study adopted an interpretivist approach in order to get a closer glimpse of how senior academics develop, constitute, and transfer research knowledge especially tacit knowledge of research processes such as the conduct of scholarly research, conception and development of research papers. The interpretivist epistemology is often considered ideal when the intention of the researcher is to understand the participants' views of their social world and their roles in it (Orlikowski & Baroudi, 1991:14). The interpretivist paradigm is considered ideal for this study because of this study's preoccupation with the senior academics' knowledge production practices, social repertoires, including some inferences about their enactment, and transfer of tacit research knowledge. Since this study seeks to understand the phenomenon of tacit knowledge negotiation and transfer through the meanings that people assign to these processes (Deetz, 1996), examining the worldviews of senior academics in their online learning communities would render a "window" into how these academics leverage, transfer and retain expert research knowledge. Therefore, an understanding of different meanings academics assigns to such knowledge production processes, including their interpretation of the world, is relevant to this study.

3.3   RESEARCH APPROACH

The design of a study starts with the selection of a topic and an approach. Creswell (2013:3) identifies three main types of research approaches: qualitative, quantitative and mixed-method. This study adopts a qualitative approach because of the nature of research questions posed in this study and the descriptive nature of the phenomenon (i.e. knowledge management). According to Creswell (2008b:7), qualitative research is an inquiry approach used to explore and understand a central phenomenon. In qualitative research, the researcher relies on the views of the participants with the inquiries conducted in a subjective manner (Creswell, 2008a: 46). Thus, for any research question to be answered, the researcher needs to ask the participants general questions to extract their views and develop in-depth narratives of meaning about their experiences and perspectives on the subject matter. Overall, this research method seeks to understand people's experiences in their world (Hancock, 1998:2). Therefore, a qualitative approach is ideal due to the subjective nature of the enactment, documentation, application and transfer of knowledge (the knowledge management process), and the communicative technologies and social practices that surround such processes under consideration in this study.

3.3.1   Justification for the Use of the Qualitative Research Approach

The current research adopted a qualitative research approach. Qualitative research is "a form of social enquiry that focuses on the way people interpret and make sense of their experience

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and the world in which they live" (Holloway & Wheeler, 2002:30). It involves an in-depth investigation of human behaviours in their natural settings and examines motives that govern those behaviours. This study, conducted at the Central University of Technology, Free State (CUT), involved in-depth semi-structured interviews, a focus group discussion, document analysis and action research cycles.

3.3.1.1 In-depth semi-structured interviews

In the first phase, in-depth semi-structured interviews were carried out with staff from the Faculty of Engineering, Built Environment and Information Technology. According to Kumekpor (2002), an interview is a conversation between two or more people, where questions are asked by someone (interviewer) to elicit facts or statements from the other (interviewee). Interviews can be telephonic, face-to-face, or via skype. Interviews are either conducted in a structured, unstructured, or semi-structured format. In this qualitative study, in-depth semi-structured interviews were employed to collect and make sense of data (Gray, 2014) on experienced senior academics and junior staff's knowledge management processes and practices. A semi-structured interview is an interview that is somewhat structured but allows for new ideas and questions to be communicated during the interview as a result of what the interviewee says. The interviewer in a semi-structured interview generally has a framework of themes to be explored (Kumekpor, 2002). Finally, the average interview time was 20 to 45 minutes per person.

The researcher was guided by Denscombe's (1998) view that interviewing is not an easy option and that it needs good planning, proper preparation and sensitivity to complex values of the interaction taking place during the interview. It was vital to secure the correct records of the senior academics retiring or exiting from the institution, in consistence with this study's focus on potential knowledge loss arising from the resignation, so that the research becomes more targeted at such academics should they be users of SharePoint. The researcher conducted in-depth semi-structured interviews with 22 participants drawn from the Faculty of Engineering, Built Environment and Information Technology at the Central University of Technology, Free State (CUT). Regarding the gender and race of the 22 interviewees, 4 were female comprising of 2 Africans and 2 Whites and 18 were males comprising 7 Africans, 1 Indian and 10 Whites.

Furthermore, an in-depth, open-ended interview was conducted with one Human Resources (HR) Practitioner from the CUT to gather data on the number of experts retiring in the following five years. The researcher considered this instrumental in determining disciplinary areas were knowledge gaps and losses may arise upon such academics and researches' retirement, transfer or resignations. The conduct of this interview was consistent with the realisation that

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HR departments of higher education institutions (HEIs) are entrusted with the responsibility of attracting, maintaining and retaining the knowledge base of employees (Nel, van Dyk, Haasbroek, Schultz, Sono & Werner, 2004).

As suggested by Babbie and Mouton (2001:2581), the researcher conducted the interview personally and recorded the answers of the interviewees. The researcher used the semi-structured interview guide (schedule) with a prepared list of questions and sent them to the interviewees in advance. The interview schedule was used because it provided the respondents with ample time to go through the questions before the interview was conducted. It also created a conversational partnership between the researcher and the interviewees and enabled the researcher to conduct a well-organised interview and helped to avoid repetition of questions. The semi-structured interview enabled the researcher to probe and "get to the bottom" of both the knowledge management practices in place and gaps that still exist.

The interview allowed the researcher to obtain adequate and in-depth data/information, probe issues deeply and ask more, complex and sensitive questions. Prior to interview sessions, participants were assured of confidentiality (see section 3.12). Each interview session lasted for 20 to 45 minutes per person. With the participants' permission, the researcher audiotaped the interviews. Notes were also taken throughout the interviewing process. This was compared with what was audiotaped in order to prevent possible omissions and inconsistencies of parts of the interview process. The face-to-face technique allowed the researcher to study and analyse attitude, perceptions and motivations of the interviewees. Interviews preceded a focus group in order to develop overarching generic perspectives on academic staffs' experiences of knowledge management through the use of SharePoint.

3.3.1.2 Focus group discussions (FGDs)

This research's qualitative approach uses a focus group interview in the second phase. Greenbaum (1993: 45-9) defines a focus group interview as a focused discussion where a moderator leads a group of participants, usually ranging from five to 12 people, through a set of questions on a particular topic. A focus group discussion is a useful research tool when the researcher does not know much about the participants and thus provides rich and detailed information about feelings, thoughts, understandings, perceptions and impressions of people in their own words (Liamputtong, 2011: 6). Focus group questions need to be open-ended in order to generate as much discussion as possible, being phrased with words such as who, why, what, when, and how (Rubin & Babbie, 2013: 114). Good focus group questions often begin with such phrases as, "*How do you feel about . . . ,*" "*What is your opinion of . . . ,*" or "*Please describe . . . .*" A single session can be used in studies where the population of interest is very small (Wholey, Hatry, & Newcomer 2010, 356-9).

The aim of conducting a focus group discussion was to identify and address the potential loss of institutional knowledge and expertise encountered when experienced and specialised employees retire. The researcher conducted one focus group discussion with seven staff (comprising of an Associate Professor and two Senior Lecturers) and four junior staff (comprising of two Lecturers and two Junior Lecturers). The fact that one Senior Lecturer, Lecturer and Junior Lecturer were from department A and the rest were from Departments B, C and D together with the differences in terms of seniority ensured the diversity of the purposive sample selection. For the focus group discussion, the researcher combined participants of different gender, age and experience by grouping academics with different demographic traits to ensure diversity of opinion and inclusivity. The participants were also selected according to the variations in their academic title so that the research could consist of various experiences and views on the research. In addition, the participants were chosen based on the principle of providing the best understanding of issues relating to knowledge management strategies of experienced employees to identify and address the potential loss of institutional knowledge and expertise as experienced and specialised employees retire. These issues were not sufficiently resolved during the interviews, and therefore FGDs served to provide detailed clarifications on the issues highlighted in the interviews.

3.3.1.3 Document Analysis

An analysis of the CUT documents was conducted in the final phase of the research approach. The researcher was aware of the inevitable loss of tacit research knowledge upon the transfer, retirement, and the exiting of the few, highly experienced professoriate at Universities of Technology (Rambe & Mbeo, 2017). As a result, the researcher considered the advantage of the written record or policy documents drawing on mainstream knowledge management literature and the authors' observations on the use of emerging technologies at the CUT. The purpose of this consideration was to assess the feasibility of a knowledge management model for attracting and retaining the tacit research knowledge of these senior academics. This enabled the researcher to develop more complete and well-substantiated conclusions about the institution's knowledge retention and transfer practices.

The researcher draws on SharePoint intervention, a widely adopted emerging technology in the Faculty of Engineering, Built Environment and Information Technology at CUT, to demonstrate the feasibility of this knowledge management model. The main argument is that an in-depth examination of the knowledge production processes in a networked community of senior academics and novice researchers using a ubiquitous, low threshold technology can provide a "window" into how this model can be developed. The issues relating to knowledge management at this institution, including its capture, documentation and transfer will be the focus of the analysis.

According to Bowen (2009), document analysis is the extraction of content and meaning from documents. The intention in document analysis is to interpret documents to give voice and meaning around the content of the document (Bowen, 2009). The analysis concentrated on documents that provided sufficient information on current knowledge management systems and processes in place at the CUT in order to discern comprehensive insights into knowledge retention and transfer practices at this institution. The landmark documents examined included Vision 2020, Strategic Plan, Transformation Plan, Academic Plan, Technology and Innovation Plan, Library and Information Systems Plan, Research and Development Plan, Faculty Board minutes, 2018 University Calendar, the Institutional Talent Management Strategy, and the Policy on Integrated Performance Management (iPerMS), which were readily available to the researcher at no cost. These documents are summarised in Table 3.1 below.

Table 3.1: Documents Reviewed

Document Name	Knowledge Management Theme	Level of Analysis	Division/Unit/Department
Vision 2020	Knowledge Generation, Knowledge Sharing	Institutional	Office of the Vice-Chancellor
Strategic Plan 2016-2020	Knowledge Generation, Knowledge Sharing	Institutional	Office of the Vice-Chancellor
Research and Development Plan 2014-2020	Knowledge Generation	Institutional, Faculty and Departmental	DVC: Research, Innovation and Engagement
Transformation Plan 2016-2020	Knowledge Sharing	Institutional	DVC: Teaching and Learning
Academic Plan: 2014-2020	Knowledge Sharing Knowledge Transfer	Institutional, Faculty and Departmental	DVC: Teaching and Learning
Technology and Innovation Plan: 2014-2020	Knowledge Sharing, Knowledge Transfer, Knowledge Retention	Institutional, Faculty and Departmental	DVC: Research, Innovation and Engagement
Library and Information Systems Plan: 2015-2020	Knowledge Generation, Knowledge Sharing, Knowledge Transfer	Institutional, Faculty and Departmental	DVC: Teaching and Learning
Faculty board Minutes	Knowledge Sharing	Faculty	Faculty of Engineering and Information Technology
CUT Calendar 2018	Knowledge Transfer	Institutional, Departmental	Registrar
Talent Management Strategy	Knowledge Retention	Institutional	Human Resources (HR)
Integrated Performance Management policy (iPerMS)	Knowledge Retention	Institutional	Human Resources (HR)

The use of data triangulation is consistent with the canons of Action Research whose intent is to contribute to knowledge creation (scientific knowledge) and improved practice (social change) in a simultaneous way as new insights into the intervention emerge and traditional practices are superceded by new practices (Johnson & Waterfield, 2004:123). This also resonates with interpretivist epistemology that emphasises the use of diverse narratives of respondents to capture the complexity of the phenomenon under study.

3.4   RESEARCH DESIGN

A research design is an inquiry within the approach that provides specific directions to the procedures used in the research (Cresswell, 2013:12). There exist several research designs and these include the grounded theory, experiment, action research, case study, ethnographic study, archival research and survey research (Cooper and Schindler, 2011:139). The action research design was applied in this study. Action research underlies a detailed preliminary investigation of a phenomenon and the planning processes that underpin it. Furthermore, it focuses on the provision of interventions to address the perceived undesirable state of affairs /anomaly, reflection on these practices to learn from and improve practices, and the evaluation of the interventions based on clear assessment criteria. Hence, action research forms the basis for understanding the technology-supported knowledge management approach adopted in this study.

The study seeks to identify knowledge gaps in knowledge transfer, existing knowledge transfer practices currently in use, knowledge retention strategies, and to explore the explicit and tacit processes of knowledge transfer between the experts and the young novice academics, as well as documenting such practices. The implication is an evaluation of the knowledge production and as such, this resonates with Dzansi, Rambe and Coleman's (2015) views that action research involves a cyclical process emphasising planning, action, evaluation of action and continuous monitoring of the entire system. Furthermore, action research is anchored in close collaboration between researchers and the practitioners, and promoting change within an organisation such as Higher Education institutions (HEIs) in this study (Gray, 2014); hence, it serves as a best fit for this study.

3.5   ACTION RESEARCH

According to Hudson et al. (2006:581), action research is a "framework for thinking systematically about what happens in social situations, implementing action for change and monitoring and evaluating the effects of the action with a view to continuing development". The knowledge transfer process cannot be a straightforward or transparent process. As a result, an approach that allows for the researcher's intense reflection on the practitioner's systematic creation, documentation and transfer of knowledge was deemed necessary. Thus, action research was considered appropriate for this purpose.

The fact that SharePoint provides a collaborative environment in which the expert and the novice become active participants in the research process and transfer of knowledge determined the choice of the study's research approach. The chosen approach, in this case, action research, would be one that deals with the collaborative exploration of interventions

best suited this investigation. Furthermore, action research requires the researcher to choose what to study, design the tools of investigation, choice research methodologies, to conduct experiments, and make meaning of the results. Therefore, given its focus on acting on, observing, reflecting and evaluating the interventions, action research was the best fit for such an investigation of knowledge management approaches in higher education (see Figure 3.1).

The study's intervention is in the introduction of SharePoint for the generation and retention of tacit research knowledge to enhance transfer research knowledge to junior academics and researchers and to enhance research outputs at the CUT (Rambe & Mbeo, 2017). In addition, SharePoint can contribute to the in-depth understanding of both the types of knowledge shared and the different research practices, repertoires, and activities that give effect to research knowledge production and retention processes. Emerging Technologies, such as SharePoint are consistent with the CUT's institutional culture of knowledge sharing, research collaboration, showcasing research and its application to the academic community. According to Ibrahim et al. (2006:19), a culture that promotes open sharing of knowledge can be realised if leaders clearly articulate the value of the knowledge management initiative, attract support at all levels of the organisation, reward proper knowledge management behavior, and encourage employee interaction. It is against this background that the research sought to explore the culture of knowledge sharing facilitated by an emerging technology domesticated by academics and researchers.

3.6   DISCUSSION OF ACTION RESEARCH PROCESS

The key element of the Action Research process is a sequence of "Plan", "Act", "Observe" and "Reflect" activities (Townsend, 2013). This sequence of activities is called an "Action Research Cycle" and is similar to the basic concept of continuous improvement in quality management, the Deming cycle of "Plan", "Do", "Check" and "Act" (Sokovic, Pavletic and Pipan, 2010). The Cycle can be considered as an improvement process for the research project.

Figure 2.1: Action Research Cycle

Source: The action research process (Creswell, 2013)

Action research contributes simultaneously to knowledge creation (scientific knowledge) and an improvement of practice (social change) as new insights into the intervention emerge and traditional practices are superseded by new practices. Furthermore, action research is a cyclical process with a participatory character itself and an interactive form of knowledge development that is underpinned by a democratic impulse (McNiff & Whitehead, 2011).

3.7 THE STEPS IN THE ACTION RESEARCH CYCLE (CYCLE ONE)

3.7.1 Identify the problem

In view of the challenge of losing the prime research knowledge of highly experienced aging professoriate upon retirement, transfer or resignations, this study assessed the feasibility of a knowledge management model founded on the utilisation of emerging technologies for knowledge generation, retention and transfer at a University of Technology with an emergent research culture. Retirements, resignations, transfers of the highly experienced aging professoriate and restructuring of activities were conceived to lead to "knowledge loss", particularly the tacit knowledge that resides in the minds of the resourceful people. There was a need to identify the positions where the potential knowledge loss was conceived the greatest in order to mitigate the challenge of knowledge loss. Knowledge loss is high in the Faculty of Engineering, Built Environment and Information Technology at CUT as the engineers' and technologists' skills are conceived as relevant and critical by most industries and hence the higher cases of staff turnover compared to other faculties. This makes retaining engineers and technologists very difficult in this faculty at this institution.

Therefore, the infinite nature of the knowledge held by experienced aging professoriate leaving or retiring and the limited time and money available to the university, demands that the knowledge retention be prioritised. Hofer-Alfeis (2009), Beazley, Boenisch and Harden (2002) suggest prioritising the fixed areas of knowledge to be retained and tailoring these to the role of leaving an expert.

3.7.2 Planning

The planning phase involves the determination of problems and their possible solutions and this usually starts with a formulation of the background of the study and study of existing systems (Aidinopoulou & Sampson, 2017). These planning phase activities create an understanding of the current system before the new system and intervention is introduced. Rhodes (2012) states that, in this phase, the real-world problem is analysed through interacting with different stakeholders inside the system under investigation.

3.7.2.1 Population and sampling

The permanent staff of CUT on both the Bloemfontein and Welkom campuses constituted the target population to be investigated. The human resource database at the institution suggests that currently, the CUT has 276 permanent academic staff. This population consists of staff from the four faculties; Engineering, Built Environment and Information Technology, Management Sciences, Health and Environmental Sciences, and Humanities. Furthermore, 208 staff members of the aforementioned total population are Lecturers and Junior Lecturers while the remainder are Senior Lecturers, Associate and Full Professors. For the purpose of this study, the focus was on staff from the Faculty of Engineering, Built Environment and Information Technology because academics and students in this faculty are familiar and already using SharePoint.

A non-probability sampling technique, purposive sampling, was chosen because of the qualitative nature of the study and the character of research questions posed (Gray 2014: 217). Purposive sampling is often preferred by researchers who conduct qualitative research, especially if the focus is on a distinct group of people with clearly identified common characteristics, which is also used in this study.

The study involved 22 academics who participated in the research and these comprised of two full Professors, five Associate Professors/HoDs, 5 Senior Lecturers, and 6 Lecturers and four 4 Junior Lecturers located in the Faculty of Engineering and Information Technology. Informed by Oates' (2006) recommendation for researchers to send prospective interviewees a list of themes or topics to be covered before the actual interview, the researcher gave the

22 respondents time to mull over the themes to be covered during the interview. For the purpose of this study, the sample of staff from the Faculty of Engineering and Information Technology was on the basis that SharePoint is also a low cost, inexpensive, low threshold technology, which is easily accessible to the CUT academic community's (lecturers and students) resource-constrained contexts. Furthermore, these academics were purposively selected based on that SharePoint is a technology, which they are already using, so familiarity, accessibility and ease of use would improve the academic community's buy-in as far as its sustained use is concerned.

Furthermore, experienced staff, such as full Professors, Associate Professors and Senior Lecturers, knows the staff members who have the knowledge that needs to be captured and the knowledge that is needed for the operations of the university. The Lecturers and Junior Lecturers have knowledge on the academic running of the university. The human resource department has information on staff recruitment and retention. The accessible population is a more narrowly defined and manageable population from which a sample is drawn for measurement while a sample population is a carefully selected subject of the accessible population that is representative of the whole population with the relevant characteristics (Mugenda & Mugenda 2003:9).

For this study, the planning process involved determining the knowledge to be retained as part of the knowledge transfer and retention framework, which was explicit and tacit knowledge. The high risk of knowledge loss was attributed to the minimal use of collaborative knowledge generation platforms such as SharePoint.

3.7.3 Acting

Gedera and Williams (2013) state that in this phase, actions are taken to solve the existing problem. The solution to the challenges of working in silos, the culture of information hiding by academics and lack of collaborative academic and research work led to the introduction of SharePoint. The assumption of using SharePoint was that the collaborative tendencies it supported (e.g. sharing work in progress, collaborating on collaborative projects, initiating joint lecturing and joint research) would allow academics and researchers to integrate the theory of collaborative research with practice, and guide the novices' knowledge development through the generation and transfer of knowledge.

The researcher arranged the training on the use and benefits of SharePoint, and this training took place in mid-2015. The six Heads of Departments in all departments within the Faculty of Engineering and Information Technology, five Senior and six Junior academics were invited to the SharePoint training as a knowledge repository for the externalisation, sharing, storage

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and transfer of organisational knowledge. The researcher included HoDs since these are the academic leaders responsible for knowledge development and the development of the research strategy of their Departments in line with Faculty and University strategic plans. The Dean, as the Faculty Head, expects HoDs to create and exploit new opportunities for knowledge transfer in order to secure mainstream and third stream income and explore new areas of teaching and research.

3.7.4 Observing

Interviews were conducted in this phase with six academic staff comprising of two Associate Professors, two Senior Lecturers and two Lecturers from the Faculty of Engineering and Information Technology. The observed dominance of the SharePoint usage in the Faculty of Engineering and Information Technology in comparison to other faculties meant that there is a need for the expansion of SharePoint practices from one faculty to other faculties to foster a transfer and retention of knowledge at the institutional level. Again, the researcher observed that there was also verbal output, such as, informal networking, informative phone calls and face-to-face discussions that were not documented anywhere.

3.7.5 Reflecting

Tripp (2005) states that in order to identify what to improve, reflection is to be conducted for effective planning, implementation, and evaluation. Therefore, this phase concludes the cycle by reflecting on what happened at the end of each cycle. Conclusions were drawn in this cycle to reflect on the functioning of the SharePoint intervention system. Interviews were conducted with five HoDs to get their views upon using the intervention, in order to determine if the intervention did function as intended or would be re-modified.

3.8 SUMMARY OF THE CYCLE ONE – INITIAL CYCLE

	Activity	Participants	Motivation
Planning	Interviews were conducted to identify knowledge research gaps that necessitated the use of SharePoint.	The study involved 22 academics comprising of 2 full Professors, 5 Associate Professors/HoDs, 5 Senior Lecturers, and 6 Lecturers and 4 Junior Lecturers located in the Faculty of Engineering, Built Environment and Information Technology.	Minimal use of the SharePoint platform to share knowledge.
Acting	SharePoint training was piloted to integrate theory with practice and guide the researcher to generate strategies for the transfer of knowledge.	5 Senior, 6 Junior academics, as well as the 6 Heads of Departments in all six departments within the Faculty of Engineering and Information Technology.	SharePoint training was piloted by adopting a purpose-built Knowledge Management tool - and maintaining a shared knowledge repository.
Observing	Interviews were conducted in this phase with academic staff.	6 academic staff comprising of 2 Associate Professors, 2 Senior Lecturers and 2 Lecturers.	Instead of all four faculties within CUT using SharePoint platform, it was only used in the Faculty of Engineering and Information Technology.
Reflecting	Interviews were conducted to get views upon using the SharePoint intervention.	5 Head of Departments (HoDs).	To encourage staff to share knowledge among themselves and to leave their silos for more engaged interaction.

Furthermore, the transfer of research knowledge demands the senior academic/researcher to desist from hiding knowledge by increasing the levels of knowledge accessibility to the novices. The target of SharePoint intervention is much more than just collaboration between humans. Instead, it connects people, process and information across organisational boundaries in the higher education setting. Hence, SharePoint provides an extensive search framework.

3.9 CYCLE TWO – FINAL CYCLE

The process of the SharePoint intervention was carried out all over again following the phases of Action Research (AR) cyclical model. In other words, the researcher decided to combine, during the second cycle of research, the results obtained in the first phase by using other data collection methods in the second phase, i.e. focus group and document analysis.

The focus group interview was conducted in this second cycle with seven staff (comprising of an Associate Professor and two Senior Lecturers) and four junior staff (comprising of two Lecturers and two Junior Lecturers) to gain a better understanding of the knowledge management strategies that were insufficiently addressed in the responses to the interviews. The researcher repeated the same activities and further scrutinised university policy documents, research policies, research and development plans, faculty board minutes, departmental academic plans and the institutional talent management strategy and human resource strategy on the use of emerging technologies (SharePoint) to assess the feasibility

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of a knowledge management model for attracting and retaining the tacit research knowledge of these senior academics at CUT.

3.9.1 Planning

In this cycle, the researcher re-planned and re-designed the intervention; and went back to the planning phase. A focused group discussion was conducted, as part of the re-plan, with seven staff comprising of an Associate Professor, two Senior Lecturers, two Lecturers and two Junior Lecturers from the Faculty of Engineering, Built Environment and Information Technology. Furthermore, as part of faculty digital strategy, this faculty strives to equip staff and students with the skills to leverage digital information and technology (SharePoint). Nonetheless, the planning process determined the knowledge to be retained as part of the knowledge transfer and retention framework- which was explicit and tacit knowledge. The high risk of knowledge loss was attributed to academics and researchers' culture of working in silos and claims about knowledge hoarding from experienced academics.

Issues related to the former Dean of the Faculty who was encouraging staff to use the SharePoint platform emerged during the second phase. Participants iterated that the promotion of this Dean to a higher position within the university resulted in a majority of them reverting to the use of local drive (L drive) that they had been using for more than a decade ago to manage their documents and records.

3.9.2 Acting

The researcher arranged another training session again in March 2015 on the use and benefits of SharePoint. The training involved six Heads of Departments (HoDs) as strategic leaders to address strategic issues within their departments in the Faculty of Engineering and Information Technology. SharePoint provides sites where team members can share research projects, hold discussions in forums, collaboratively author documents, and record their performance of assigned tasks. Recurring tasks can be represented as entries in a SharePoint "list" - a flat-file database in which each task is a "list item."

3.9.3 Observing

A focused group discussion was conducted in this phase with seven senior staff (comprising of an Associate Professor and two Senior Lecturers) and four junior staff (comprising of two Lecturers and two Junior Lecturers) from the Faculty of Engineering and Information Technology. The researcher observed that experienced senior staff with research skills were unwilling to share their expertise on a SharePoint platform due to the fear that junior staff

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would supersede them once they develop their competence fully. Another contributing factor was that of trust issues whereby whenever asked for information, staff is hesitant to share and left wondering, "Why do you need this information?" and, "Who will this be shared with?"

3.9.4 Reflecting

Conclusions were drawn in this post cycle to reflect on the functioning of the SharePoint intervention system. The researcher reviewed the institutional documents such as the Research and Development Plan 2014-2020, CUT Strategic Plan 2016-2020 and found out that the SharePoint platform is still used but mainly for meetings and policy documents since documents are still shared by email. Furthermore, there were conflicts that might have occurred since CUT is in the process of proposing the use of Converis website at an institutional level using Clarivate Analytics. Converis is a Research and Innovation Management System (RIMS), which can assemble professional profiles for a complete and up-to-date collection of all teaching, research, and service-related activities such as providing an overview of all accomplishments, with advanced analytic reports of outputs and impact. This means the CUT is in the process of using a comprehensive solution that will empower it to proactively manage information and workflows across the research and innovation lifecycle through Converis.

3.10 SUMMARY OF THE CYCLE TWO – FINAL CYCLE

	Activity	Participants	Motivation
Planning	Focus Group were conducted to identify knowledge research gaps that necessitated the use of SharePoint.	Seven academic staff (comprising of an Associate Professor and two Senior Lecturers) and four junior staff (comprising of two Lecturers and two Junior Lecturers) was conducted.	Prevalence of staff working in silos and knowledge hoarding.
Acting	SharePoint training was arranged with strategic leaders (HoDs) to address strategic issues within their departments in the Faculty of Engineering and Information Technology.	Six Heads of Departments (HoDs) within the Faculty of Engineering and Information Technology.	SharePoint training was conducted by introducing Heads of Department to (My Sites) as a shared knowledge repository to integrate theory with practice, guiding the researcher to generate strategies for the transfer of knowledge.
Observing	Focus Group interview with academic staff.	Focus Group with seven academic staff (comprising of an Associate Professor and two Senior Lecturers) and four junior staff (comprising of two Lecturers and two Junior Lecturers) was conducted.	Experienced senior staff with research skills expressed unwillingness to share their expertise on a SharePoint platform due to the fact that the researcher observed trust issues whereby senior researchers felt I that junior staff would steal their ideas and reap the rewards that are rightfully theirs.
Reflecting	Document Analysis was conducted in the final phase to determine the current knowledge management systems and processes in place at CUT.	Meeting and policy documents were reviewed.	CUT is in the process of proposing the use of Converis website at an institutional level. Converis is a Research and Innovation Management System which can assemble professional profiles for a complete and up-to-date collection of all teaching, research, and service-related activities - providing an overview of all accomplishments, with advanced analytic reports of outputs and impact.

The implications for using SharePoint for meetings and sharing policy documents and the introduction of Converis means that experienced or senior staff will no longer be able to hide information. The CUT is in the process of using a comprehensive Converis Research Information System solution that will proactively manage information regarding Publications Management, Research Analytics and the Research Portal Modules as well as other associated research information as support for monitoring, dissemination and reporting.

3.11 DATA ANALYSIS

All data was transcribed verbatim by the main author in Microsoft Word, sorted and scripted to identify main themes and patterns using thematic content analysis. Thematic content analysis enables the construction of meaning from data. Sikes (2004) note that the meaning-making process involves the identification of themes/patterns, organising them into coherent categories, and identifying other themes that serve as sub-categories.

This study focuses on Knowledge Management (KM) drawing on Action Research (AR), which relies on a recursive and cyclical process of planning, implementation, observation and review/reflection, and a multi-method approach. As a result, the different KM stages and what happens at each stage needs to be captured in conjunction with the AR stage involved (since AR involves data collection and analysis at the same time). In addition, as each AR stage unfolded, the supportive data extraction methods needed to be integrated into each process to ensure the compatibility of each cycle with the data collection method and the relevance of the data collected. All these conceptual, AR processes and data collection techniques were employed to address each of the Research Questions. Each interview was assigned codes and the line-by-line coding enabled the researcher to have a close study of the data and to lay the foundation for its synthesis. Once coding had been completed, codes were clustered together into meaningful groups to generate themes. In some cases, the groups overlapped and as such, they were collapsed to allow for more synthesis and rigor.

3.12   RESEARCH ETHICAL CONSIDERATIONS

Permission to conduct the interviews and focus group discussions with staff at the CUT was granted by the Director: Institutional Planning and Quality Enhancement (see Appendix B). All the staff participating in the study were given a copy of the permission letter. Participants were assured that their involvement in the study would be confidential and anonymous. Pseudonyms are used in situations where it was necessary to identify participants in relation to their utterances, as shown in Table 4.1 of the next chapter on presentation and discussion of research findings. In addition, participants were guaranteed that the information obtained from this study would be kept confidential and available for review only by the researcher and the supervisor. Participants were also guaranteed that their involvement in the research would not harm them in any way. As the audio recording was used for data collection, the researcher made it clear to participants that the recordings would not be exposed publicly or to anyone and would I be used only for research purposes.

Qualitative research involves numerous ethical issues due to the intensive personal contacts between the researcher and the participants (Yin, 2011). Sikes (2004:16) establishes that it is necessary for researchers to put into consideration the ethical implications of their research to mitigate negative risks, prejudices and undesirable consequences on subjects that may arise from the conduct of their research. Therefore, the researcher is obliged to prevent the participants involved in the study from being subjected to any harm, be it physical, social or psychological, which might be caused by their participation in the study or after publishing the findings (Cohen *et al.,* 2007). Though this study did not provide circumstances in which the

participants could come to any harm, the researcher, nevertheless, adhered to the following ethical standards to ensure research etiquette were diligently followed:

- The researcher obtained the necessary ethical clearance form and written permission to conduct the research study from the Central University of Technology, Free State before conducting the interviews.
- The employees who participated in the study were informed of the purpose of the study and that no financial benefit would accrue from their active participation.
- Employees were also informed of their voluntary participation in interviews and of their right to withdraw from the study without any prejudice or harm. They were also assured of their anonymity and the reporting of their views in aggregate form to protect their identities for their dignity, safety and security.
- Employees were also informed that privacy would be guaranteed at all times and that all information that is gathered would be treated as confidential.
- Pseudonyms were used in situations where it was necessary to identify participants in relation to their utterances.
- Data from research reports was reported in aggregated form to protect the individual identities of participants.

3.13   RELIABILITY AND VALIDITY

Sekaran and Bougie (2009) state that data-driven conclusions derived from the qualitative data in the study should be plausible, reliable, and valid. Merriam (1998) suggests that reliability in research should be determined by whether the results are consistent with the data collected. Therefore, the following techniques were provided to achieve this: First, the researcher explained the assumptions and theory behind the study to respondents; second, she used multiple methods of data collection and analysis (triangulation) to ensure the comparison and contrasting of data from diverse sources; and lastly, she explain in detail how data was collected to allow for an audit trail if necessary. The data triangulation involved collecting data using in-depth semi-structured interviews, focused group discussions, document analysis and the researcher's reflections on these data collection sources to ensure reliability and validity. The data triangulation was used in this research study to establish the extent to which SharePoint, as an emerging technology, would serve as a platform for generating, transferring and retaining research knowledge among experienced and emerging academics at CUT.

The scheduled interviews, which lasted 45 minutes on average, were conducted in the offices of the research participants. The use of their offices rather than that of the researcher was intended to level out power differences that may arise from geographical space. An interview schedule, containing a broad list of core questions (see Appendix D) for guidance, was used to guide the researcher in exploring the risk of knowledge gaps and losses arising from the departure of the ageing professoriate with valuable knowledge upon retirement and resignation from the university. One focus group interview was included to cover issues that may not have surfaced during a one-on-one interview. This type of interview is conducted after a series of individual interviews to further explore the general nature of the comments from different individuals (Plaisant & Shneiderman, 2005). In this study, the interviews, both individual and focus group, were recorded using a digital audio recorder while simultaneously making extensive handwritten notes.

According to Mugenda and Mugenda (2003), validity refers to the extent to which a research tool measures what it is intended to measure. After each interview process, the interviews were transcribed verbatim to ensure no valuable information was omitted. Therefore, to strengthen the credibility of the qualitative findings, transcripts were sent to research participants for approval and their additional comments were incorporated into the transcripts and analysis process. Providing participants, a copy of the transcribed notes from audio recordings (Harvey, 2014) enables participants to review detailed interview responses (member-checking) and verify the interpretive accuracy as this increases credibility (Carlson, 2010). Verifying participants' answers, response uniformity, and within method triangulation (Casey & Murphy, 2009) provide a construct to test the credibility of the instrument in relation to the interview questions. The similarity in responses among the participants throughout the interview corroborates the research instrument and the accuracy of responses (Stevenson & Mahmut, 2013).

The recorded information was replayed numerous times by the researcher during the analysis process (Hancock, 2002) and the data collected was categorised (Flick, 2013) allowing themes to be grouped according to objectives of the research study. Barrett and Twycross (2018) affirm that to develop insights into the research problem, qualitative research requires data which are holistic and rich, allowing themes and findings to emerge through careful analysis. As such, inductive analysis was employed for the development of themes even though some prior categories from Knowledge Management and Action Research were also drawn upon to provide more nuanced analysis.

3.14 SYNOPSIS OF THE CHAPTER

Chapter Three detailed the research design and methodology that were applied in carrying out the research in order to meet the objectives of the study. The research approach and design, data collection instruments, data analysis, population and sampling techniques were discussed. The qualitative research approach was adopted for this study. In this study, data collection techniques (interview, focused group), document analysis method and action research cycles that were used for this study and the justification for selecting these techniques were also discussed. The next chapter, Chapter Four, will present findings of the study based on data collected from the interviews conducted for this study, focused group discussions, document analysis and action research cycles.

CHAPTER 4: PRESENTATION AND DISCUSSION OF RESEARCH FINDINGS

4.1   INTRODUCTION

In Chapter 3, the research methodology of the study was discussed. This chapter presents and discusses the research findings based on the in-depth semi-structured interviews, focused group discussions, document analysis and the researcher's reflections on these data collection sources as per the Action Research approach and the literature that informed the study.

The retirement of experienced employees results in the loss of valuable knowledge if there are no effective knowledge management strategies that would have been put in place to prevent it (Burmeister & Rooney, 2015). This study assessed the feasibility of a knowledge management (KM) approach founded on the utilisation of emerging technologies (ETs) for knowledge generation, retention and transfer in a particular faculty at a University of Technology in South Africa.

Knowledge management (KM) refers to both the totality of organisational strategies aimed at identifying and transferring the explicit knowledge held in artefacts and tacit knowledge possessed by people and communities meant for the creation of new knowledge in an organisation. Furthermore, knowledge management, which entails the management practices and processes that allow organisations to leverage their intellectual capital and create sustainable competitive advantage (Durst & Wilhelm, 2012) is becoming central to increasing research productivity and creating knowledge-based economies (Tempest, 2003; Liebowitz, 2011). Given the importance of knowledge in competitiveness, (e.g. university rankings, access to competitive funding from funding bodies, attracting leading researchers) of universities in South Africa; higher educational institutions are looking for systems and processes by which the knowledge of the well-seasoned researchers and academics can be transferred to the inexperienced junior staff to prevent knowledge loss in higher education institutions. The concepts of knowledge transfer and retention are linked to knowledge loss precipitated by the departure of experienced employees such as professors and researchers from the university because without transferring knowledge and retaining its, knowledge losses are unpreventable.

Emerging Technologies (ETs) serves as a platform for the dissemination and management of information, which range from day to day teaching and learning activities, and sharing of information. If properly constituted and well documented, such information gives birth to new knowledge. Therefore, ETs, such as SharePoint, were considered to be consistent with the

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research development imperatives of the Central University of Technology (CUT), Free State for knowledge sharing, research collaboration, showcasing research and transferring it to the broader academic community.

4.1.1 Demographic profile of study participants

The study involved 22 participants drawn from the Faculty of Engineering, Built Environment and Information Technology at the CUT, Free State. With regard to the gender and race dynamics of the 22 interviewees, 4 were female comprising of 2 Africans and 2 Whites and 18 were males comprising 7 Africans, 1 Indian and 10 Whites. This gender imbalance is representative of the employment statistics of this faculty, which is predominantly male. In addition, an interview was conducted with one CUT Human Resources (HR) Practitioner to establish those experts retiring in the following five years in view of the challenge of losing the prime research knowledge of highly experienced aging professoriate upon retirement, transfer or resignations. Nelson & McCann (2010:1) asserts that the responsibility for the management of the knowledge amongst employees within the higher education institutions (HEIs) is entrusted to its HR department. This is because they control the human resource recruitment, appointment processes and retirement processes and hence regulate the pipeline of knowledge generation and retention that way. Table 4.1 indicates the respondents who participated in the interviews:

Table 4.1: Brief description of Interviewed Participants

No of interviewees	Title of Interviewee and Department	Gender	Race
2	Full Professors, Department B and C (1 of which is an HoD and the other one is a senior researcher at professor level)	Male Male	African Foreign-National
5	Associate Professors, Department A, C, D and E (3 of which were HoDs and 2 researchers at associate professor level)	Male Male Female Male Male	Indian African Foreign National White White
5	Senior Lecturers, Department A, B, C, D	Female Male Male Male Male	White White White African Foreign National
6	Lecturers, Department A, B, C, F	Male Male Male Male Male Female	White White White White Foreign National African
4	Junior Lecturers, Department A, C, D, E	Female Female Male Male	African White White White
1	Human Resources Practitioner	Male	African

According to the Republic of South Africa, Employment Equity Amendment Act No. 47 of 2013, a Foreign National means a person not born in South Africa and who does not have

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citizenship. This term will also apply to any person who obtained citizenship after 27 April 1994 and who does not qualify as part of the designated group as per the definition contained within the Employment Equity Amendment Act as is the case with individuals with permanent residence. For this study, Africans refers to persons who are South African citizens by birth, by descent, by naturalization in terms of the South African Citizenship Act (No. 88) of 1995.

The purposive selection was instrumental to this study, given the study's interest in those who demonstrated familiarity and had used SharePoint. The skewed gender representation may be inconsequential to the credibility of findings as not all individuals were exposed to and participated in this SharePoint platform. In addition, the limited representation of female academics at senior levels at CUT reflects the gender imbalances that continue to affect Science, Technology, Engineering and Mathematics (STEM) discipline, which remains male-dominated (Penner, 2015). For instance, out of six Heads of Departments (HoDs) in this faculty where participants were sampled, only one is a female (CUT Calendar, 2018). The employment equity statistics of the CUT, as indicated in Table 4.2, allude to the overrepresentation of males in senior academic positions, which undermines female academics' opportunities of being leaders or experts in a STEM field (McCullough, 2011). However, this number may be considered insignificant in providing a panoramic view of the state of knowledge generation and retention in the Faculty of Engineering, Built Environment and Information Technology considering the overall academic staff compliment of 89 permanent staff within the six departments in this Faculty.

Table 4.2: Employment Equity Statistics

Employment Equity Statistics of academic staff per age, race and gender in the Faculty of Engineering, Built Environment and Information Technology for 2017 – 2018

Total numbers of **Junior Lecturers** at CUT per faculty including race, gender and age range;									
Faculty	Age range	Race & gender							Grand Total
		African Female	African Male	Coloured Female	White Female	White Male	Foreign national Female	Foreign national Male	
Engineering/Information Technology	25-30	1	0	0	0	0	0	0	1
	30-35	1	0	0	1	0	0	0	2
	35-40	2	1	0	0	0	0	1	4
	40-45	0	0	0	0	1	0	0	1
	Total	4	1	0	1	1	0	1	8

Total numbers of Lecturers at CUT per faculty including race, gender and age range;											
Faculty	Age range	Race & gender									Grand Total
		African Female	African Male	Coloured Female	Coloured Male	Indian Female	Indian Male	White Female	White Male	Foreign national Female	Foreign national Male	
Engineering/Information Technology	20-25	0	0	0	0	0	0	0	0	0	0	0
	25-30	1	0	0	0	0	0	0	0	0	1	2
	30-35	2	1	0	0	0	0	1	4	0	1	9
	35-40	3	2	0	0	0	2	0	2	0	0	9
	40-45	1	1	0	0	0	0	3	3	0	2	10
	45-50	0	2	0	0	0	0	1	5	0	4	12
	50-55	0	0	0	0	0	0	1	2	0	0	3
	55-60	0	3	0	0	0	0	1	3	0	0	7
	60-65	0	0	0	0	0	0	1	3	0	0	4
	Total	7	9	0	0	0	2	8	22	0	8	56

Total numbers of **Senior Lecturers** at CUT per faculty including race, gender and age range;									
Faculty	Age range	**Race & gender**							Grand Total
		African Female	African Male	Coloured Male	White Female	White Male	Foreign national Female	Foreign national Male	
Engineering/Information Technology	35-40	0	0	0	0	1	0	1	2
	40-45	0	0	0	0	1	0	1	2
	45-50	0	0	0	0	1	0	1	2
	50-55	0	0	1	0	2	0	1	4
	55-60	0	0	0	1	0	0	0	1
	60-65	0	0	0	0	1	0	0	1
	Total	0	0	1	1	6	0	4	12

Total numbers of **Associate Professors** at CUT per faculty including race, gender and age range;							
Faculty	Age range	**Race & gender**					Grand Total
		African Female	Indian Male	White Female	White Male	Foreign national Male	
Engineering/Information Technology	35-40	0	0	0	0	1	1
	40-45	1	0	0	3	1	5
	50-55	0	1	2	0	1	4
	Total	1	1	2	3	3	10

Total numbers of **Professors** at CUT per faculty including race, gender and age range;					
Faculty	Age range	**Race & gender**			Grand Total
		White Female	White Male	Foreign national Male	
Engineering/Information	50-55	0	1	1	2
	60-65	0	1	0	1
	Total	0	2	1	3

Total: 89 permanent staff within the six departments in this Faculty

It should be borne in mind that the study focus was on a few senior and experienced professorate and researchers responsible for driving knowledge transfer and retention in the faculty. Moreover, although many emerging researchers could have benefited from co-creation of knowledge with senior academics and researchers and yet only those who had shared knowledge with senior academics qualified for inclusion in the study. These two critical points justify the noted sample selection as supplied by the researcher. It is critical to note that the individual departments from which the participants belong is concealed for the purpose of ensuring the anonymity of participants. This obtains, even though the aggregate details of employment statistics were provided as these did not in any way, compromise the identity of participants.

This study focused on Knowledge Management (KM) drawing on Action Research (AR), which relies on a recursive and cyclical process of planning, implementation, observation and reflection and a multi-method approach to data collection. As a result, the different KM stages (that is knowledge generation, knowledge sharing, knowledge transfer and knowledge retention) and what happened at each stage of data collection needed to be captured in conjunction with the AR stage involved (since AR involves data collection and analysis simultaneously). In addition, the supportive data extraction methods needed to be integrated into each stage, as each AR stage unfolded, to ensure the compatibility of each AR cycle with the data collection method and to ensure the relevance of the data collected.

Table 4.3 summarises KM themes, AR cycle stages and data collection techniques employed by the researcher. The table also depicts the challenges that emerged in the Faculty of Engineering, Built Environment and Information Technology at the CUT during the data collection process.

Table 4.3: Knowledge Management Stages and Action Research Cycles

Knowledge Management Stages, Action Research Cycles, data collection techniques and associated challenges identified in the Faculty of Engineering, Built Environment and Information Technology at CUT[1]

Research Objective Addressed	Knowledge Management (KM) Themes	Categories and associated challenges			
		Action Research (AR) Cycle stage and corresponding activity	**Interviews**	**Focused Group**	**Document Review**
1, 2	Knowledge Generation	**Planning** • Introduction of SharePoint as an emerging technology for the planning phase.	• The use of external consultants and borrowing from other divisions or organisations are examples of generating knowledge. • Generation of new knowledge unfolds through publishing the findings of studies. Challenges • Senior academics and junior staff failed to work collaboratively and exchange knowledge as they tended to work in silos.	• The restructuring process of senior and executive management at CUT resulted in the high risk of knowledge loss.	• Reviewed Policies and procedures that covered knowledge generation and how these documents could assist in identifying the number of experts and professionals whose positions might be affected by brain drain. • Consultation, workshops, seminars and conference reports which facilitated knowledge generation.
3, 4, 5	Knowledge Sharing	**Action** • Pilot SharePoint training was introduced and implemented by the researcher as part of a collaborative and action research platform among junior and senior academics in the faculty.	Knowledge Sharing Techniques via SharePoint • SharePoint was predominantly used for conducting internal meetings and not for knowledge generation. • SharePoint was also used for Email documents, Skype, Videoconferencing. • Knowledge-sharing sessions and library repository were used to share knowledge Challenges • There was a general feeling that senior academics lack time to share knowledge. • Some junior academics and researchers were concerned that some senior researchers and academics were not supportive of sharing of knowledge (knowledge hoarding).	• Some junior academics and researchers were concerned that heavy teaching workload is hindering knowledge sharing.	• Seminars and conferences were considered by most participants as credible platforms used by this faculty for sharing knowledge.
6	Knowledge Transfer	**Observation** • The researcher created departmental sites for observation of senior academics behaviours in terms of transferring knowledge to junior academics.	• The interviews with senior academics affirmed that presentation of study findings at seminars and conferences remained the main conduit for disseminating knowledge for academics. • Although publications in local accredited journals remained the main focus of knowledge transfer, publication in international journals was not that popular. Challenges • There was evidence of limited succession planning judging from vacant positions that were not filled.	• Workshops, seminars and conferences. • Meetings. • Consultation.	• Seminars and conferences • Newsletter
7	Knowledge Retention	**Reflecting** • The reflection that the SharePoint platform is still used mainly for meeting and policy documents.	• Inability to retain experienced and qualified staff.	• Mentoring. • Exit interviews.	• No written knowledge retention policy and strategy.

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[1] Interviews and focus group excerpts of participants were not provided in this table for easy readability and to reduce clutter in this table.

It emerged from findings that although KM stages do not necessarily need to be consecutive, cyclical and recursive due to the inter-relationships between them, as reflected in AR stages, they are presented based on AR cycles to demonstrate only the salient knowledge management dimensions highlighted at each AR stage. For example, knowledge generated through research was often shared among peers during seminars and conferences with the transfer of such knowledge to outside partners often unfolding through research publications in journals. In addition, organisational knowledge created through developing academic policies, strategic plans, academic and operational plans and minutes of meetings during internal meetings, tended to be transferred through more coherently synthesised documents such as annual reports and newsletters, which are sometimes posted on websites.

4.2. FINDINGS AND DISCUSSION

KNOWLEDGE MANAGEMENT (KM) STAGES, ACTION RESEARCH (AR) STAGES, INTERVIEWS, FOCUSED GROUP AND DOCUMENT REVIEWS EVIDENCE.

The following section discusses the research findings based on knowledge management stages, (that is, knowledge generation, knowledge sharing, knowledge transfer and knowledge retention); action research stages (i.e. planning, acting, observe and reflection); interviews covering knowledge management stages, followed by focused group discussions and document analysis. It is critical to note that interviews were conducted first with key informants to provide a panoramic landscape on knowledge management at the institution. Once the overall picture had been developed, key themes and issues that were underexplored or were unclear were further investigated using focus groups and document analysis. Document analysis was carried out last because the researcher, who is a member of the institutional committees, was well informed about institutional documents and just re-read them for information purposes.

The provision of a Knowledge Management (KM) stage and its dimension is critical in order to demonstrate its integration and alignment to Action Research (AR) so that the application of each AR stage can be understood in context. There is a consensus in KM literature that KM commences with knowledge generation as knowledge cannot be shared or transferred unless it exists in the first place.

4.3 KNOWLEDGE GENERATION

Knowledge generation consists of the creation of knowledge by knowledge producers (Hemsley-Brown & Sharp, 2003: 449). Knowledge generation corresponds with the research mission of the universities (Alexandropoulou, Angelis & Mavri, 2009), with its aim of expanding the boundaries of human knowledge and promoting creativity through the production of doctoral researchers and codified knowledge. Additionally, Dorri and Talebnejod (2008) consider knowledge generation as one of the most important missions of universities today, the need for which can be assessed from the external dimension (response to the societal needs) and internal dimension (improvement in the quality of education, promotion of the place of university, and increase in income). Rowley (2000) is also of the view that knowledge generation is the core process of Knowledge Management in all organisations, especially HEIs, is to create knowledge through a variety of means, such as scientific discovery or discussion. This view is supported by Siadat, Hoveida, Abbaszadeh and Moghtadaie (2012) who regard knowledge generation as enshrined in professors' scientific socialisation, the combination of scientific findings, and publication of research findings.

4.3.1 Action Research Cycle I – Planning

Action research develops through the self-reflective spiral: a spiral of cycles of planning, acting (implementing plans), observing (systematically) and reflecting. Consistent with the knowledge generation's focus on identifying existing research gaps, which result in the loss of research knowledge at CUT, the researcher applied the initial action research stage "planning" to examine the high risk of knowledge loss. The planning phase of the Action Research (AR) cycle focuses itself with determining Knowledge Management (KM) problems and their possible solutions; as a result, the background of the study is formulated and existing systems are studied (Aidinopoulou & Sampson, 2017). This is done to get an understanding of the current system before the introduction of a new system and interventions.

The researcher noted that staff from the Faculty of Engineering, Built Environment and Information Technology staff at CUT used g a network drive folder called Local Drive (L drive) to store and retrieve documents. The use of the L drive regarding knowledge generation, especially, its use as an information repository and its inaccessibility to staff when they are off-campus had limitations. The researcher introduced SharePoint as a technology intervention for the unconstrained generation, retention and transfer of research knowledge to junior academics and

researchers to enhance staff's interest in increasing research outputs at CUT. Although SharePoint is just one of the wider generation of emerging technologies, it was considered for knowledge generation since it allowed spatially distributed communities to engage individually and collectively in ephemeral activities such as sharing research experiences, storytelling, informal meetings and for communities of practice that can be triggered momentarily but need to be immediately captured to prevent knowledge loss. Furthermore, SharePoint is an inexpensive and low threshold technology (Underwood & Thomas, 2015), which is easily accessible to CUT academic community's (lecturers and students) even in resource-constrained contexts.

SharePoint is a technology, which academics in the Faculty of Engineering, Built Environment and Information Technology are already using in informal ways. This suggests that familiarity, accessibility and ease of use would improve the academic community's buy-in as far as its sustained use is concerned. SharePoint was conceived as an ideal platform for knowledge management because of its potentialities as a platform for the generation, dissemination and management of information, and in handling routine activities and tasks (Castillo-Soto & Baker, 2011). Therefore, sufficient exploitation of these functionalities would enable the generation of new knowledge. The need to address the question on the identification of existing research gaps, which result in the loss of research knowledge at the CUT (Research objective 2), necessitated the researcher to conduct interviews with Heads of Departments and Associate Professors, to examine the high risk of knowledge loss with senior academics. The findings related to knowledge generation captured in the first AR stage are discussed in subsequent sections.

4.3.1.1   *Working in silos*

The interviews with senior academics demonstrated that there is little collaboration between colleagues of the same department (i.e. silo mentality), which complicates the exhibiting and externalisation of excellent research practices across the entire faculty. Working in silos often hinders individuals from sharing knowledge of work processes and this results in knowledge hoarding. As participants highlighted:

> *One of the major constraints at CUT is the prevalence of knowledge hoarding and staff working in silos where there is a low collaboration between staff. Therefore, research continues to be*

discipline-based and opportunities for cross-disciplinary research are not exploited fully (Ernest, Associate Professor A[2], African Male, Interview: 9/10/2017).

Our institution does not have a formal plan for the preservation and use of institutional memory. Individuals chose to share knowledge when they felt like doing so and experts could leave the institution at any time with their knowledge and insights (*Donald, Head of Department A, African Male, Interview, 22/09/2017*).

One researcher summed up these interview findings as a situation prevailing in the Department in the following words: "All the participants vehemently denied the existence of a knowledge-sharing culture in the Department. They cited a lack of collaborative research projects in the Department and limited co-authorship of research articles in scientific journals as evidence of this prevailing culture." As a result, the researcher sought to explain this culture in the context of the fledgling nature of this university. The Central University of Technology, Free State (CUT), is a relatively new university, was established as a fully-fledged university of technology (UoT) in 2004, following the incorporation of Vista University's Welkom campus into the Technikon Free State. The different student and staff demographics and attendant cultures of the two campuses were merged. The former Technikon Free State was formerly a predominantly White university, whilst the former Welkom campus of Vista University was, and still is, a predominantly black university. The researcher infers that sharing of knowledge across cultures was very rare as many informants revealed. In fact, staff members tended to share knowledge within their racial groups and with those elements that championed values and behaviours similar to theirs, a culture that seems to cohere with evidence of knowledge hiding reported by research participants.

4.3.1.2 External Consultants

The main source of the generation of knowledge are human efforts which are developed through conducting good educational activities and research activities in the area of interest. Examples of knowledge generation in higher education institutions include the use of external consultants and borrowing from other divisions or organisations. In addition, researchers, faculty experts and students regularly contribute to the knowledge base by generating new concepts. Participants reiterated, in response to the researcher's question on the research gaps that are inherent in CUT knowledge production strategies, which have resulted in the loss of expert research knowledge at CUT that:

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[2] Note that pseudonyms were used to protect the actual identities of participants in accordance with research ethics.

The role of the university is basically to create and disseminate knowledge. As Engineers, we create knowledge through our consultation with industry experts. We interact with people and our stakeholders through guest lecturers, workshops, seminars and conferences (Billy, Senior Lecturer, African Male, Interview: 9/10/2017).

Sometimes during classroom lectures and training programmes, new ideas are created through the interaction between the lecturers, industry advisors and students and in this way knowledge is created (Steve, Head of Department B, White Male, Interview, 22/09/2017).

The interview findings revealed that lectures in the classrooms and training programmes give a new direction to generate knowledge. Knowledge can be created by asking questions and watching the responses that provoke an environment of conversations, responses and interactions. New ideas are sometimes created and developed during classroom lectures. This development is facilitated through the interaction between the expert, teacher and students and these become issues of debate and discussion and create knowledge. Although the incorporation of one's research into the curriculum and the taught content presented a good platform for the management of research knowledge, there is a large schism between the experienced professor's aspirations and reality. This researcher's experience as a Faculty Officer, who coordinates academic administrative activities of the faculty at the CUT, led to the observation of various impediments to knowledge production. Thus, the pressure to deliver the curriculum in turnaround time, to sufficiently prepare students for exams, the large numbers of novice researchers at the institutions, and the lack of knowledge on the practical application of research-led teaching, make the professor's aspirations to produce knowledge a mirage. It can then be argued that the difficulty in implementing research-informed and research-led teaching is one of the knowledge gaps that undermine the generation and transfer of knowledge in classrooms in this faculty at CUT.

The study also conducted a focus group discussion with seven staff comprising of an Associate Professor and two Senior Lecturers and four junior staff consisting of two Lecturers and two Junior Lecturers to establish loss of expert research knowledge at CUT.

4.3.1.3   Senior and Executive Management Restructuring

The existing knowledge gaps at CUT should be understood in light of improving efficiency in the use of resources (e.g. financial resources) and cost recovery, which triggered a restructuring exercise in 2007 and was concluded in 2011. The exercise, which resulted in the freezing of outlier salaries (top-notch salaries that were anomalies) had the unintended effects of pushing some

senior highly experienced academics out of academia. The CUT recently underwent a major senior and executive management restructuring to ensure effectiveness and efficiency in current expenditure allocations on salaries to save costs. The restructuring process involved the consolidation of certain senior positions (e.g. Executive Director: Finance and Operations, to be referred as Deputy Vice-Chancellor (DVC): Resources and Operations; and o Executive Deans to be referred to as Dean of the Faculty). It also involved the abolition of some posts (e.g. directorships which were in principle former heads of departments) and the freezing of certain senior academic salaries. Since various academic staff in the Faculty of Engineering, Built Environment and Information Technology are specialists in specific disciplines, some opted for better salary packages from industry and this resulted in the loss of expert research knowledge at CUT. This background was reiterated in the focus group discussions:

> *Personally, I think the university must pay market-related staff salaries since this [i.e. the restructuring exercise] resulted in poor remuneration that forced staff to supplement their incomes through consultancy and similar income generation activities that rob the time for research (Theresa, White female Associate Professor, Focus group discussion, 3/10/2017).*

> *Some staff salaries were frozen due to restructuring and the majority of these research-active staff opted to get better salary packages from the industry which often offers higher rates of remuneration. In this competitive environment, strategies must be developed to recruit qualified academics but also retain seasoned and experienced professionals (Ronny, White Male, Lecturer, Focus group discussion,22/09/2017).*

> *CUT is a former Technikon where the mandate for academic staff was just teaching, so this was not a research-intensive institution. The way I see this, it is impossible to replace years of experience accumulated already within the shortest period of time, with a salary that is not even market related (Clinton, White Male, Senior Lecturer, Focus group discussion, 9/10/2017).*

The findings from focused group discussion revealed that the low salaries that are offered to active and seasoned researchers have already forced many researchers to leave universities and this may prevent future generations of scholars from joining academia. Badat (2010) affirms that the improvement of public subsidies to attract outstanding graduates to the academic profession and more generally facilitate the recruitment and retention of academics through adequate remuneration is vital for the future research well-being and their contribution of universities to society. Additionally, some active researchers get involved in consultancy work in order to augment their salaries and this literally robs the time that could be dedicated to conducting cutting

edge research. Bailey, Cloete and Pillay (2011) warn that even researchers may stay at university on a full-time basis and yet still use the time available in addition to lecturing and administration responsibilities, to do private work, i.e. consultancy through the university.

The researcher consulted institutional documents such as the CUT Strategic Plan 2016-2020, faculty board minutes and departmental academic plans to identify and establish the number of experts and professionals whose positions might be affected by brain drain, retirements and resignations. Hence this meant that the departure of a person from the CUT increased the risk of losing tacit knowledge, particularly if it was not captured and stored somewhere. Table 4.4 illustrates the retirement data for staff at Occupational Level 3 for the period 2018-2022.

Table 4.4: Retirement data Occupational Level 3 for the period 2018-2022

Faculty / Division	Department / Section	Post number	Post title	Occ. Level	Campus	Years until retirement
Research/ Innovation/ Engagement	Library/Information Services	888	University Librarian	3	Bloemfontein	4
Teaching/Learning	Institutional Planning/Quality Enhancement	955	Deputy director: Data management	3	Bloemfontein	4
Engineering/Information Technology	Acad. Admin: Engineering/Information Technology	537	Faculty administrator: EIT	3	Bloemfontein	4
Teaching/Learning	Innovation in Learning/Teaching	176	Dep Director: e-Learning/ Educ. Technology	3	Bloemfontein	5
Registrar	Student Services	4350	Asst. director: Counselling (Welkom)	3	Welkom	2
Teaching/Learning	Innovation in Learning/Teaching	622	Snr coordinator: Student acad. support	3	Bloemfontein	0
Humanities	Communication Sciences	4000	Snr lecturer: Comm. sciences (Welkom)	3	Welkom	5
Health/Environmental Sciences	Health Sciences	1930	Snr lecturer: Clinical technology	3	Bloemfontein	0
Health/Environmental Sciences	Life Sciences	2046	Snr lecturer: Environmental health	3	Bloemfontein	3
Engineering/Information Technology	Mechanical/Mechatronic Eng.	45	Snr Lecturer: Mechanical/ Mechatronic Eng.	3	Bloemfontein	0
Management Sciences	Hospitality Management	1900	Snr Lecturer: Hospitality Management	3	Bloemfontein	1
Humanities	Design/Studio Art	1910	Associate professor: Clothing/Fashion	3	Bloemfontein	1
Humanities	Post Graduate Studies	224	Associate Prof: Post-graduate studies	3	Bloemfontein	2
Humanities	Communication Sciences	4050	Snr lecturer: Comm. sciences (Welkom)	3	Welkom	2
Management Sciences	Business Support Studies	2032	Professor: Entrepreneurship	3	Bloemfontein	3
Engineering/Information Technology	Acad. Admin: Engineering/Information Technology	2068	Professor: EIT	3	Bloemfontein	-2

The table sought to gauge the extent of the impending knowledge loss challenge by establishing the number of experienced professors and senior researchers whose knowledge, if lost, could be detrimental to the research performance of the institution. Taking the case of South Africa universities, the most highly qualified, experienced and productive researchers who are experts in their chosen disciplines (that is Professors and Associate Professors) at South African universities are older workers above the age of 50 years (Dube & Ngulube, 2013). The Mouton's 2018 Bibliometric Report on Research at the CUT provides a detailed account of the 30 most

research productive researchers and professors at CUT. The breakdown by age shows that 13 of the 30 were over 55 or over in 2018, implying that they would need replacement in slightly less than a decade to come. Twenty of them were in their fifties and above, meaning they would need replacement in less than 15 years, while 6 were already above 60 (Mouton, 2018). This future knowledge loss of senior academics in the universities sector in South Africa and the fact that in the past few years there has been a slow progression of African scholars entering the professoriate bracket is indicative of the severe circumstances that contribute to knowledge loss in academia. While the entire section above concentrated on knowledge generation and AR stage 1 of Cycle 1, the next sections examine the next stage of KM and the corresponding AR stage 2 of Cycle 1.

4.4   KNOWLEDGE SHARING

Since this study discusses knowledge management stages drawing, on an Action Research approach and the associated data collection methods, it becomes critical to characterise the next stage of knowledge management from the perspective of its corresponding AR stage. Yu, Lu and Liu (2010:32) define knowledge sharing as "processes that involve exchanging knowledge between individuals and groups." In fact, knowledge sharing is considered one of the important goals of an organisation where individuals' experiences and knowledge are exchanged as organisational assets, contribute to the creation of new knowledge and its retention for future learning without or drawing on the affordances of Information and Communication Technology (ICT) platforms (Liaw, Chen & Huang, 2008). Knowledge sharing, therefore, is the wilful application and exchange of one person's or a group's ideas, insights, solutions, experiences (knowledge) to another individual or individuals either via an intermediary, such as a computer-based system, or directly (Underwood & Thomas, 2015). This sharing is essential when employees settle in organisations while others exit. Those quitting could be retirees who have accumulated years of experience and knowledge that new employees need to utilise in work situations and gain on the job experience. The researcher drew on "acting" as an action research stage to gain some insights into the technological platform that could allow for the sharing of knowledge.

4.4.1 Acting

Consistent with the need to follow systematic stages of action research to understand better the SharePoint platform, Gedera, Williams and Wright (2015) state that in the action phase, actions are taken to solve the existing problem. The researcher, in consultation with the Dean, liaised with the Heads of Departments in the Faculty of Engineering, Built Environment and Information Technology, and arranged for SharePoint training due to the challenges associated with L-drive concerning knowledge sharing and knowledge loss arising from the departure of seasoned academics and researchers (see Figure 4.2). The training focused on how to use SharePoint as an emerging technology platform to enhance and facilitate the sharing of knowledge and derive the academic benefits of its usage as part of the action stage called Acting.

The researcher postulates that the full potential of the SharePoint system can only be realised if users are aware of what it has to offer and how to use the available features. This is consistent with McLeod, Childs, Lappin and Siggers' (2010:340) claim that, as a complex system of knowledge sharing, educators would need training and guidance on its use to enable them to use it optimally and effectively. Without such training, SharePoint may not be used fully by all staff. Therefore, the poor adoption of the tool may be partly attributed to staff not knowing what was available and how to use it. Figure 4.1 is a screenshot of the Dean's email on outlook inviting faculty members' to the SharePoint training after the research liaised with him on this matter as part of taking action (i.e. Stage 2 of AR).

Figure 3.1: Outlook invite to the SharePoint training

Figure 4.1: Dean's email on outlook inviting faculty members' to the SharePoint training

Training on the use of SharePoint, which was conducted in the computer laboratory of the Centre of e-Learning, took place in mid-2015 and was extended to 20 people as elaborated below. The training involved 17 participants, six Heads of Departments, five Senior and six Junior academics, from six departments within the Faculty of Engineering, Built Environment and Information Technology. They were invited to the SharePoint training as a knowledge repository for the externalisation, sharing, storage and transfer of organisational knowledge. A certified Microsoft Business Partner facilitated each of the 2-hour training sessions with the help of internal Manager for Web Services. The researcher included HoDs as these are academic leaders responsible for knowledge development as well as for the development of the research strategy of their Departments in line with Faculty and University strategic plans.

The session took the format of PowerPoint presentation on the functions of SharePoint technology and how to work with sites (site templates, create sites and navigate sites. The session also focused on how to manage access controls (permissions levels and permissions inheritance); site columns and content types (site column gallery, create site columns and access site content type gallery. Finally, the session also had presentations on working with lists and library views (default views and custom views); page content (adding content to the pages in a site and web part pages); forms library (creating a forms library, managing documents and versioning) and office integration (excel, outlook, access integration and SharePoint workspaces).

The presentation was followed by a demonstration of such capabilities on a server through *server site definitions, workflow and site administration* using blogs, workspace, wikis and workflow. Training and development are critical to enabling users to operate effectively and efficiently in the new environment. As a result, some of the participants shared their training experiences through course review forms. One participant noted that: "*This training provided a high-level introduction to SharePoint platform, as the number of capabilities for the transferring, sharing and preserving of knowledge and functionalities as well were explained in detail.*" Another participant pointed out that: "*during the training, one senior staff member reported that he is pleased that most staff attended SharePoint training to acquire new knowledge in order to keep abreast with new trends and practices. The training content offered is pitched at the power user level; for example, server site definitions, site administration and workflow.*"

The researcher employed interviews to evaluate the nature of ETs that could be harnessed in the generation, transfer and retention of research knowledge in selected CUT academic faculties

worst affected by the departure of senior academics (Research Objective 3). It is equally important to realise that although technology offers invaluable mechanisms for knowledge sharing, some challenges and pitfalls may hinder its effective use. These include, but are not limited to, the following: lack of time to share knowledge using technology and execution of heavy teaching workload using technology which may hinder knowledge sharing using the same or different technology.

4.4.1.1   Lack of time to share knowledge

One of the challenges some departments reported in interviews was lack of time to conduct research due to staff being overburdened with heavy teaching loads, a consequence of the offering of new qualifications that started in January 2018. The majority of the junior academic staff spent most of their time in teaching and did not have adequate time to conduct research or involve themselves in research-related activities where experienced researchers could collaborate and share information with novice staff.   Some of the staff members' interview responses highlighted the following:

> Being a junior academic staff member, it is very difficult to do research along with teaching because I have to prepare and teach three subjects in a semester. Along with this heavy teaching workload, we are still expected to attend a lot of departmental meetings for setting the timetable, allocation of subjects, invigilation of assessments and other administrative issues (Lydia, *Junior Lecturer, African Female, 4/10/2017*).

> *Teaching occupies most of my time; eventually, there is not enough time for me to share knowledge or conduct of research. The main way of sharing knowledge is through internal meetings, email, telephone conversation, conference or workshops* (Max, Associate Professor, Foreign-national, Male, Interview, 4/10/2017).

The findings from the interview revealed that much of the organisational knowledge is tacit (rather than explicit) in nature and thus there should be a willingness on the part of employees who possess the knowledge to share it and thus enable organisations to retain and benefit from the knowledge (Jacobs & Roodt, 2007). Therefore, time is a factor that affects the sharing of knowledge (Riege, 2005). Since collaborative technologies provided interactive spaces with opportunities for deliberation, reflection and engagement. The assumption embedded in question 3 was that technologies such as SharePoint would provide spaces for the externalisation and sharing of such knowledge at the risk of being lost as senior academics and researchers leave academic institutions.

The issue of time was not unique to interviews conducted, but was also identified in focus group discussions with lecturers and senior lecturers as a depleting organisational resource owing to increasing teaching, academic and managerial responsibilities.

4.4.1.2   Heavy teaching workload hindering knowledge sharing

The fundamental problem for the majority of participants who are academics is that there is an increased teaching load on lecturers. This means that lectures do not have enough time to share knowledge or to carry out research themselves as they used to. Some of the responses, as revealed below, confirm this burden of a huge teaching load:

> *"… time that must supposedly be spent on knowledge sharing is allotted instead to teaching preparation and development of teaching materials" (*Lydia, Lecturer, African Female, Focused group discussion, 4/10/2017).

> *Instead of sharing knowledge with the young generation of academics and produce research output, my "research time" becomes absorbed by preparation for teaching responsibilities* Hector, Senior Researcher, White male, Focused group discussion, 5/10/2017).

The focused group findings revealed that the teaching of newly phase-in programmes and academic responsibilities implies that academics are under significant pressure to fulfil their teaching, assessment and marking responsibilities. This implies that they have limited time to conduct research, collaborate and share information with postgraduate staff and students. Drawing on the argument of Lawson et al. (2009: 158), knowledge sharing is the outcome of informal and formal communication where the formal could be shared by technology fairs, schedule meetings and request of information. The knowledge that could be shared among learning institutions members includes best practices; knowledge found in research articles, abstracts, and non-academic articles; and knowledge on how to manage the university records. In addition, knowledge shared by individuals becomes organisational knowledge (Peterson 2012:68) with connectivity and interactivity, enabling individuals and groups to create knowledge through knowledge sharing. However, lack of time seems to hamper the sharing of knowledge even though the informal mechanism of sharing information can be performed outside the work environment.

The nature of Emerging Technologies (ETs) that could be harnessed in order to facilitate knowledge sharing processes in universities include SharePoint workspace, blogs, wikis and workflow. These assist the organisation in obtaining a competitive advantage through increased productivity, innovation and improved workforce agility. The benefits of using SharePoint for

knowledge sharing are centralisation of information, co-authoring allowing multiple editing at once, easy accessibility of information and knowledge. These benefits of using SharePoint for Knowledge Sharing are advantageous because centralised information is accessible to everyone who has been granted access within the department at anytime and anywhere as long as there is internet. Therefore, the researcher argues that SharePoint training was introduced to create academic's awareness of the technological platform and could allow for the transfer of knowledge in selected CUT academic faculties worst affected by the departure of senior academics.

4.5   KNOWLEDGE TRANSFER

Knowledge transfer is an activity that facilitates knowledge flows in organisations (Bou-Llusar & Segarra-Cipres, 2006) and further refers to the exchange of knowledge between units within a firm (internal transfer) or between different firms (external transfer). Transferring knowledge, therefore, refers to the sub-processes of distributing and sharing organisational knowledge. Technology also plays an important role in knowledge transfer since it facilitates the effective distribution of tacit and explicit knowledge. Publications, presentations, websites, white papers, policies, and reports are examples of mechanisms used to transfer knowledge in universities. The main challenge confronting organisations, however, is to shift the emphasis placed on key skills, business processes, and technologies towards creating a systematic and well-integrated approach to generating, codifying, and transferring knowledge throughout the organisation.

4.5.1   Observe

The third stage of the Action Research process is Observation. As mentioned in Chapter 3, the observation process involved determining the knowledge for retaining as part of the knowledge transfer and retention framework, which was explicit and tacit knowledge. Knowledge is created as explicit knowledge in the form of documents, guidelines, procedures as well as tacit knowledge in the form of experiences, judgements, views and perceptions that resides with individuals. Nonetheless, the researcher conducted a document analysis of minutes of the faculty board meetings *to explore emerging technologies that would be relevant and appropriate for the management (i.e. capturing, documenting, transferring and retaining) of research knowledge among senior academics (professors and senior researchers) and emerging researchers at CUT (Research objective 5).* She established that meetings, emails, video-conferencing and

teleconferencing' and Skype were the most commonly used tools for knowledge transfer at CUT. This is consistent with findings of a study conducted by Staplehurst and Ragsdell (2010) on two UK small and medium enterprises (SMEs), where it emerged that knowledge flows unfold via emails and meetings.

Each one of these dominant communication channels is described briefly below.

4.5.1.1 Electronic mail (E-mail)

E-mail is a system that enables users to compose, transmit, receive and manage electronic messages and images across networks from computer to computer (Laudon and Laudon 2007). An individual can share knowledge with one or more people through this technological channel by routing and or forwarding a message using a distribution list (Laudon and Laudon 2007; Saharabudhe, 2001). In addition, an e-mail has capabilities for attaching text documents or multimedia files to messages (Laudon and Laudon 2007). Sending an e-mail is free except for the cost of data or Internet service. An e-mail can be sent to any place around the world and enables individuals involved in a community of practice to share knowledge via the internet and can be spread across the world.

4.5.1.2 Video-conferencing and teleconferencing

This is a facility whereby teleconferencing allows the additional capability of viewing participants via video screens. A videoconference allows a community of practice to share knowledge and have visual contact with each other, thus indicating how many individuals across the world can participate in sharing knowledge through video-conferencing (Saharabudhe, 2001:275). Teleconferencing is a basic technique of conversing simultaneously via telephone or email groupware. Laudon and Laudon (2007) aver that internet telephony enables organisations to use internet technology for voice transmission over the internet or private networks. Linked to telephony technology is the use of cellphones to share and retain information. Mobile phones enable people to communicate and access the internet where conventional telephone or internet service is expensive or unavailable (Laudon & Laudon 2007). Through short message service (SMS), individuals receive and send data and alphanumeric messages that can be forwarded, stored and later retrieved. Therefore, the technological advancements, such as the current five-generation (5G), is powerful enough to transmit voice, video, graphics and other rich media (Laudon & Laudon 2007).

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4.5.1.3 Skype

Skype is a free instant messaging application that makes the video or telecommunication over the Internet more convenient and interesting. It supports video chat, voice meeting, text chat, file transfer, and other communication functions, which greatly satisfy users' different needs and using habits. During Skype meeting, if the researcher is writing a document or creating a spreadsheet or PowerPoint presentation and need to collaborate with others, the researcher can use Office 365 and Skype to co-author and edit while in a meeting or instant message (IM) conversation. Therefore, everyone who participates in the co-authoring session sees changes made to the document in real-time.

4.6   KNOWLEDGE RETENTION

Kirsch (2008) argues that knowledge retention is about focusing on the critical knowledge at risk of loss, prioritising what is at risk based upon potential knowledge gaps and their impact on overall organisational performance, and then developing actionable plans that have a return on investment effects on the organisation. Knowledge retention aims at retaining as much of the departing employees' expertise and knowledge as possible. It is a managerial practice to ensure that knowledge is captured and retained before experts leave the organisations through various forms of attrition (Dan, 2008). Appropriate strategies and approaches must be developed to capture the employees' expertise and retaining it as organisational knowledge. Levy (2011) states that knowledge retention makes an expert's most valuable knowledge to become an organisational asset. Based on these facts, knowledge retention can be defined as those activities directed at retaining valuable knowledge necessary for the operations of an organisation to help sustain its operations effectively and efficiently into the future.

4.6.1   Reflecting

The Action Research stage that coincided with knowledge retention as a Knowledge Management stage was the reflection stage. Reflection retention refers to the ability to retain critical knowledge that is at a high risk of being lost. Tripp (2005) states that there is a need reflection in order to identify what to improve for effective planning, implementation, and evaluation. According to Kidwell, van der Linde and Johnson (2000), universities need to put mitigation mechanisms in places such as processes, policies and strategies in order to deal with knowledge retention challenges that face institutions of higher learning. Martins (2010) affirms that identifying the risks factors would indicate to the organisation where to focus on in its efforts to retain knowledge and

enable it to design and implement interventions that would ultimately contribute to knowledge retention.

The researcher assessed how the SharePoint intervention system functioned to capture possible work processes relevant to knowledge retention purposes. The researcher noted that, in recognition of challenges and opportunities noted above, SharePoint could be used for improving document management, to support collaborative research work with colleagues from other institutions and support research groups. SharePoint can also be used to improve cross-departmental or institutional working teams and to provide a personalised portal where staff and students can log-on in one place and access all the different systems of the university since departments are given admin rights and manage own sites. Such a reflection identifies the potential for knowledge loss arising from failure to make use of existing knowledge management platforms at the institution and suggests solutions to mitigate against this loss.

*Figure 4.2: Sharing of meeting documents and policy reviews*
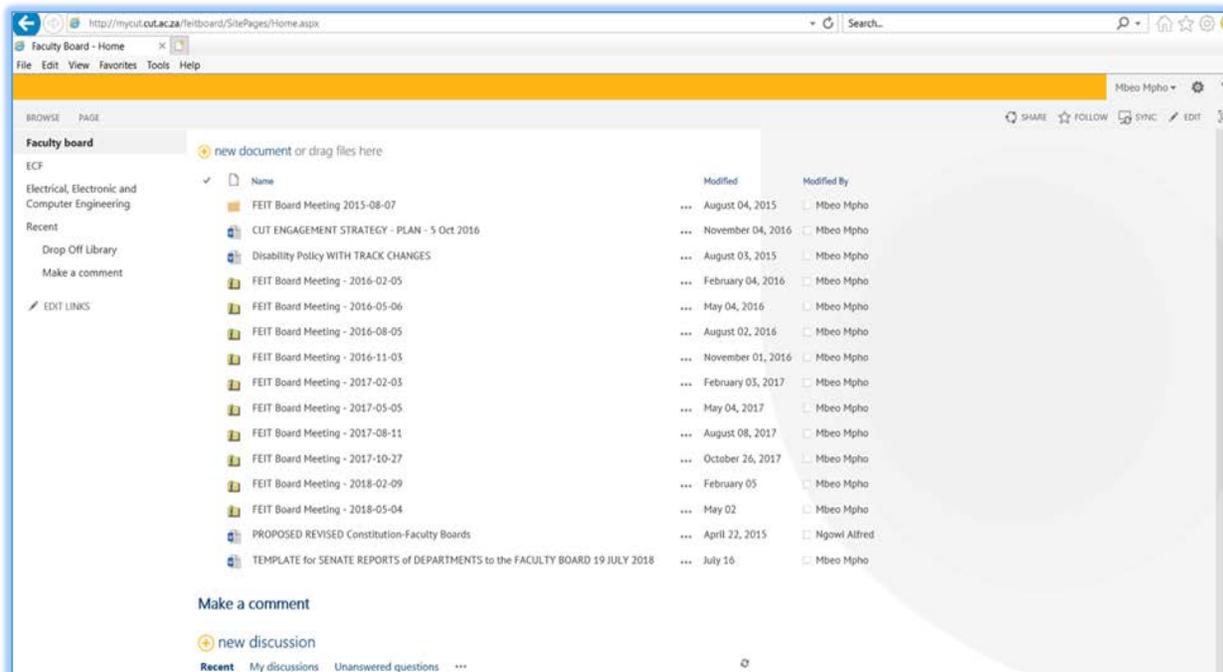
Figure 4.2: Screenshot for sharing meeting documents and policy reviews

Despite multiple functions that SharePoint can perform, which were presented to staff during the training session, it is clear from the above screenshot, Figure 4.2 that, the faculty uses SharePoint as a document management system. The platform is used primarily to upload various forms of documentation such as minutes and agendas instead of using it as a collaborative knowledge generation and sharing tool for senior academics at CUT. This finding resonates with Padilla's (2006) assertion that most organisations do not document their relevant operational knowledge. The disturbing reality is that such knowledge is easily lost when the producers of such knowledge depart from these institutions.

4.7   SUMMARY OF AR CYCLE I

Findings in the first cycle emerged from reflecting on the functioning of the SharePoint intervention system. Interviews were conducted to get HoDs' views on using the intervention to determine the effectiveness of Emerging Technologies in the management (i.e. generation, transfer and retention) of research knowledge at the CUT and if the intervention did function as intended or would be re-modified. HoDs responses during interviews indicated that staff still prefer to use the L drive that they have been using for more than a decade to manage their departmental meeting documents. Evidence from focus groups discussions and document reviews also demonstrated that SharePoint was used mainly for meeting documents and policy reviews.

4.8   KNOWLEDGE GENERATION

This section constitutes the second phase of KM stages and the second cycle of AR. It captures both the KM stages and their corresponding AR stages to provide a cohesive and comprehensive account of how KM stages cohered with AR stages. As already argued in sections above, the alignment of these KM stages and AR stages captures their simultaneous process of knowledge management process and the AR processes for representation purposes even though we appreciated that in reality some stages and process were recursive, repetitive and iterative.

Knowledge can be acquired from using codified (written) sources such as publications or patents, or in tacit form by hiring people with the needed knowledge or participating in networks where the knowledge is stored. The researcher noted that the high risk of knowledge loss was attributed to the minimal use of collaborative knowledge generation platforms such as SharePoint. Probst, Raub and Romhardt (2000:226) affirm that organisations often suffer permanent loss of valuable experts through dismissals, retirement and death. The surest way to avoid collective loss of

organisational memory is to identify the expertise and the skills of staff and capture it. According to Frost (2014), knowledge can be generated and retained in knowledge repositories. The knowledge stored in repositories is a consequence of knowledgeable individuals who work collaboratively in their networked culture, transformed institutions (i.e. procedures and formalised systems) and structures (formal and informal networks) to participate in knowledge generation activities. Yet the documentation of relevant operational knowledge is considered central to easing attrition challenges and availing the learning period for new employees (DeLong, 2004).

4.8.1   Action Research Cycle II – Planning

During the second cycle of research, the researcher considered all the results obtained in the first phase, that is from the interviews, focused group discussions and document analysis for the refinement of the SharePoint intervention. This ensured that tacit research knowledge was generated and retained and enhance its transfer to junior academics and researchers. The overall effect would then be the enhancement research outputs at CUT.

The researcher observed, as part of the planning phase in this second cycle, the drawbacks arising from the departure of the former Dean of the Faculty known for encouraging staff members to use the SharePoint platform. Some of the participants noted that:

> *Since the former Dean of the Faculty who was encouraging staff to use SharePoint platform got promoted to a higher position within the university, majority of staff reverted back to the use of local drive (L drive),* (Vincent, Professor, African Male, Interview, 9/10/2017).

It is clear from the above that SharePoint is a vital instrument for exhibiting research productivity, sharing information and showcasing work in progress, itself a "sandpit" model-based platform (Ng'ambi, 2018) for experimenting with latest technologies (see Figure 4.3) below.

Figure 4.3: Engineering Team Site
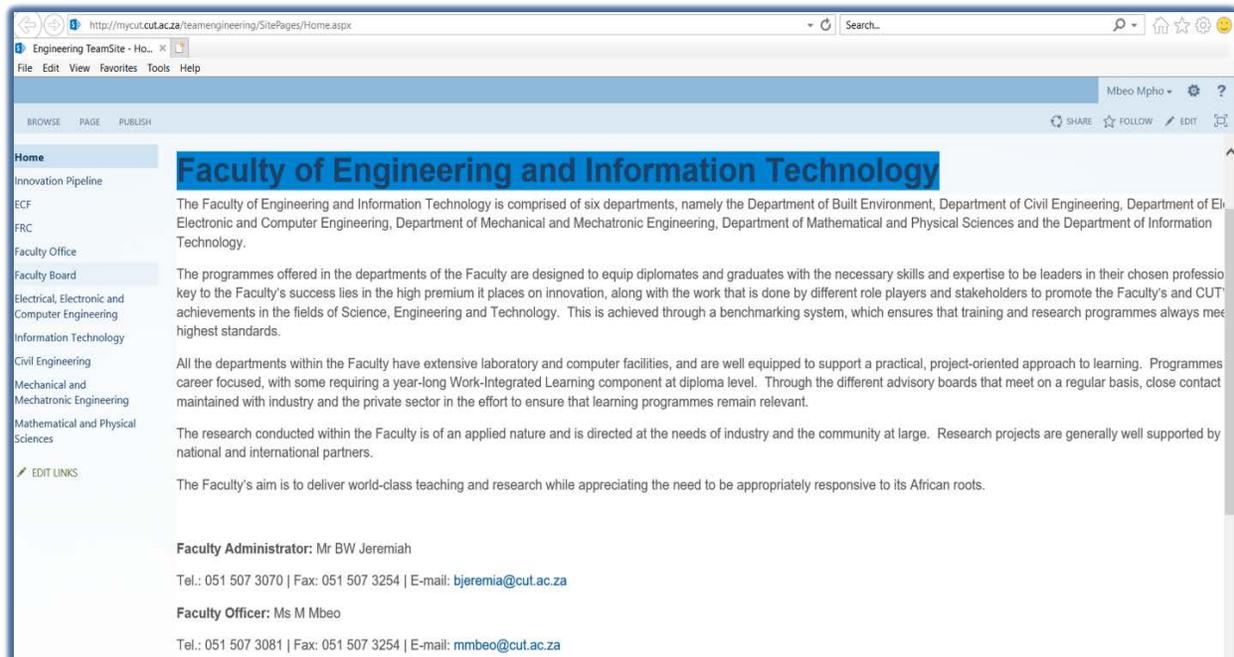
Figure 4.3: A snapshot of the SharePoint Master Page (Engineering Team Site)

The researcher conducted focus group discussion with senior lecturers to evaluate the selected current intervention strategies for research knowledge management (i.e. knowledge generation, transfer and retention) used at CUT. The findings revealed that SharePoint enhances and changes the way people and the organisation engaged in sharing ideas and expertise, meeting changing demands, and in promoting innovation. For instance, while academics used to conduct meetings, seminars and conferences to share and disseminate information, SharePoint changes the context of interaction by providing a welcoming, convivial space through which academics can select how they want to interact – for example, through private messages, through teams and group forums. According to the SECI Model of Knowledge Creation (Nonaka & Takeuchi, 1995), knowledge in an organisation can be captured, stored and shared via an integrated system. The provision of a connected interactive environment (such as *engineering team site*) that allows for individual reflection and collaborative networking of research processes between experienced researchers and novices makes an integrated system, such as a SharePoint, to serve as an effective platform of knowledge sharing as it allows staff to reflect on their experiences regularly and share knowledge. In this manner, novices can learn from the past success and failure of experts to ensure positive results. Learning from experts could help novices avoid going down the wrong paths or reinventing the wheel (Liebowitz, 2008).

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4.8.1.1   Research challenges

Research deals with the generation/creation of new knowledge, which is crucial and much linked to the teaching process. In fact, research enriches the teaching experience through the provision of world-class knowledge, which can then be disseminated informal learning environments such as lecture halls, libraries and virtual spaces such as the Internet. The creation of new scientific knowledge is also known as the discovery of knowledge (Sinha, Arora & Mishra, 2012). The discovery of knowledge unfolds through basic and applied scientific research, which results in the generation of new findings that are intended to expand the boundaries of the disciplinary field. The umbilical connections between knowledge generation and knowledge delivery lead to the assumption that recycling knowledge in the production of any new knowledge will not be of benefit to teaching as such old knowledge is merely transmitted through antiquated pedagogies.

The participants were asked about research gaps that undermine the generation of research knowledge and the following statements were recorded:

> *Research is the primary assignment of an institution for knowledge generation. The Higher Education Institutions provide knowledge to the students, manage and archive the existing knowledge for future reference. (Diana, Associate Professor, White female, 11/10/2017).*

> *Multiple research gaps confronted the CUT, and so the University has had to face serious challenges. For example, seasoned researchers, who had been contributing to research outputs were taken up into administrative and managerial positions, and the result left a void left in terms of research output (Teddy, Senior Researcher, White Male, Interview, 4/10/2017.*

The main insights from these excerpts is that the lack of a strong research mentorship process and research-based succession planning as part of a knowledge generation and transfer process as faculties depended on few seasoned academics to generate research output and promote research supervision. The interview findings also revealed that the limitation of the research experience gap that contributed to knowledge loss (i.e. a response to Question 2) between senior researchers, professors and emerging researchers expected to fill the vacated positions at CUT demonstrates the lack of a solid research tradition at Universities of Technologies (UoT) necessary to support the intergenerational transfer of knowledge.

UoTs were primarily designed to offer sectoral knowledge derived from specific occupational, industrial sectors on the one hand, and specialist disciplines on the other. The UoTs primary foci and specialisations have traditionally been in teaching and the conduct of applied research

required by industry and employers (Ntshoe & Selesho, 2014) rather than the production of scholarly research-based knowledge, which is the domain of traditional research-intensive universities. This initial objective ties well with the former Technikon focus of the university, which means that there is no large pool of middle-ranked researchers to replace the senior academics that exit the university. The dynamic character of higher education in the 21st Century and the aforementioned changes within the South African higher education landscape have presented several challenges. These challenges range from replacement of years of experience accumulated already within the shortest period of time and brain drain from Higher Education (HE) to the private sector and greener pastures internationally due to poor remuneration. This scenario further supports Handzic and Durmic's (2015) assertion that when organisational knowledge is concentrated in the minds of highly skilled individuals, they can become irreplaceable and their departure from the company may create gaps that are difficult to fill.

4.9   KNOWLEDGE SHARING

In view of the fact that higher education institutions are a key player in the knowledge economy (Chao, 2013), Bartol and Srivastava (2002) affirm that it is undeniable that knowledge sharing and exchange relies heavily on technology-based mechanisms for knowledge creation, capture, management, sharing and storage. Nonetheless, Janus-Hiekkarranta (2009) caution that it is important to realise that technology is just a tool to enhance knowledge management practices. Therefore, technology should be appropriate and user-friendly to ensure that it is utilised effectively and efficiently.

4.9.1   Acting – Final Phase

The popular sentiment from interviews on operational knowledge held with the majority of academic staff was that departments lacked knowledge repositories in which operational documentation are stored and could be located by each member of staff to ensure easy access. The researcher created a *Departmental Team Site*, as shown in Figure 4.4 below, to explore the combinations of emerging technologies that would be relevant and appropriate for the management (i.e. capturing, documenting, transferring and retaining) of research knowledge produced by senior academics at CUT. The objective was to provide academics and researchers within each department in the Faculty of Engineering, Built Environment and Information Technology with an engaging work environment for conducting collaborative disciplinary, inter-

disciplinary and cross-disciplinary projects, and a platform to store documents and learn more about other functions available on the SharePoint platform.

Figure 4.4: Departmental Team Site
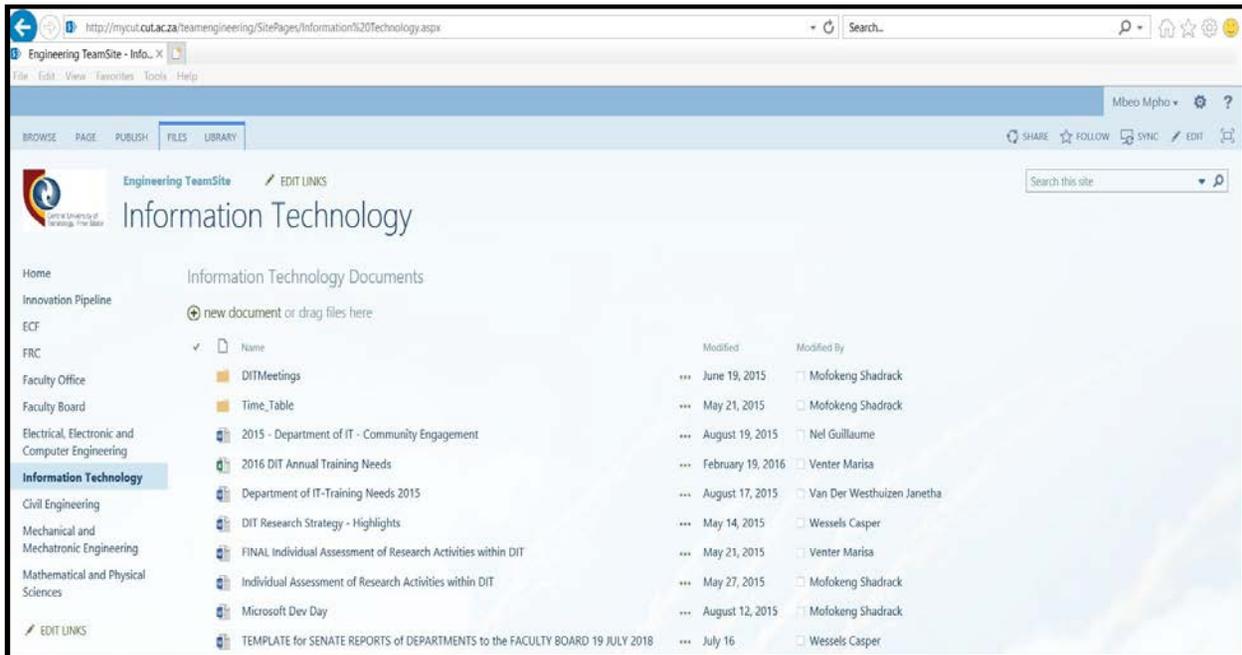
Figure 4.4: Screenshot of a departmental team site subfolder

The *Departmental team site* provided a connected interactive environment that allows for collaborative networking of research processes between experienced researchers and novices. At the same time, an integrated system such as a SharePoint served as an effective platform of knowledge sharing as it allows staff to contribute their experiences regularly and share knowledge. In this manner, novices can learn from past successes and failures of experts to ensure positive results of knowledge sharing. Learning from experts could help novices avoid making wrong decisions or reinventing the wheel (Liebowitz, 2008). In addition, SharePoint was perceived to have the potential to grow the institutional memory of the organisation through its provisions of a platform for experienced academics to generate and store content and knowledge (that is, a knowledge repository). Documents in SharePoint are also stored in browser-accessible sites, in document 'libraries' or document sets similar to folders but with unique IDs and access controls/permission that can be restricted/widened at any level. Finally, the SharePoint platform enables the display of document libraries as network drives and allows the dragging and dropping of documents from drives.

The researcher also sought to:

- evaluate the selected current intervention strategies for research knowledge management (i.e. knowledge generation, transfer and retention) used at CUT to share knowledge (Research objective 1). In addressing this question, the researcher established the various issues discussed in subsequent sections.

4.9.1.1 Knowledge-sharing sessions (KSS)

CUT conducts knowledge-sharing sessions (KSS), where executives and senior managers participate and share perspectives on issues of management and administration. Organisational communication involves communication from both management and organisational members that shapes the way employees communicate with customers and other external role-players. This necessitates employees' awareness of the organisation's key knowledge assets. Therefore, organisational communication structures can include information knowledge-sharing sessions for both senior management and employees from the lower levels of the organisation. Evelyn (2010) suggests that the use of SharePoint features and tools, such as reporting tools, data relevance, security, auditing, traceability and centralisation of data, enables an organisation to increase team collaboration. Rymer and Koplowitz (2008:1) also argue that whilst many organisations view SharePoint platform "as a collaboration application, many organisations are discovering that SharePoint is also a development platform that people both inside and outside of Information Technology (IT) use to create intranets, outward-facing portals, electronic forms, workflows, and even dashboards."

4.9.1.2 Library repository

The researcher evaluated the selected current intervention strategies for research knowledge management (i.e. knowledge generation, transfer and retention) used at CUT to share knowledge (Research objective 1). The observation made here is that the HODs projected the library repository as a platform to publish and store staff and postgraduate students' books, journals, periodicals and reports. This characterisation coheres with mainstream thinking about a knowledge repository, which conceives it as a digital place for the storage of diverse forms of knowledge. This is confirmed in the participant's views, as shown below:

...We have no repositories for knowledge sharing, but the library has an institutional repository (IR) where all the publications (dissertations, thesis, research articles and journals) published both by staff and the students are stored electronically. This is a way of storing the knowledge

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created through publications for future reference by both staff and students (Martin, Head of Department C, White Male, Interview, 22/09/2017).

*The university should encourage staff to publish their knowledge on the website or upload it in the library from where other staff and external people could access it. If I can make an example, there is no central place in our department where operational documents are kept; this means we do not store our operational relevant knowledge (*Lawrence, Head of Department E, African Male, Interview, 3/10/2017).

*The university can use the library or use its weekly newsletter to disseminate knowledge and encourage knowledge sharing among the staff (*Jeff, Professor in Department C, Interview, 4/10/2017).

The above views resonate with Lochhead and Stephens's (2004) definition of knowledge repositories as "technology-based platforms in which declarative, procedural and context knowledge are stored". The findings revealed that the Library and Information Services (LIS) has taken on the initiative to grow the Institutional Repository. In order to do so, the LIS benchmarked the knowledge management practices at peer institutions where researchers should submit hard or electronic copies to the LIS. Subsequently, the LIS assess whether the research output's copyright conditions allow the output to be published on the institutional repository.

4.10   KNOWLEDGE TRANSFER

The researcher reflected on the functioning of the SharePoint intervention system to capture work processes for knowledge retention purposes. This was done in recognition of the potential for knowledge loss due to a lack of alternative knowledge management platforms at the institution. Therefore, the researcher interpreted that the trainer's assumption was that knowledge stored via an information platform "SharePoint" can then be codified, easily shared and transferred for organisational activities, such as teaching, research and curriculum development processes.

However, the transfer of knowledge as a means for determining the knowledge to be retained is a critical process of knowledge management. Knowledge transfer t is one of t facilitates the transmission of explicit and tacit knowledge. Explicit knowledge is often created in the form of documents, guidelines and procedures while tacit knowledge is contained in the form of experiences, judgements, views and perceptions that reside with individuals.

4.10.1 Observation – Final Phase

The former Dean announced that there is a spirit of change in the Senior Management of CUT where "Business Continuity and Risk Management" are important issues. This would guard against the tendency to rely on one person for specific functions. More people should be relied upon to fulfil diverse functions so that should anyone leave or be unable to work, then there are others at the CUT who can stand in for him/her. SharePoint provides interactive interfaces that allow novices' individual reflection and senior researchers-novices' collaborative interaction, which is meaningful engagement. However, the researcher observed that the SharePoint platform is only used in the Faculty of Engineering and Information Technology; instead of all four faculties within CUT.

The researcher conducted a focused group discussion with seven staff comprising of an Associate Professor and two Senior Lecturers, two Lecturers and two Junior Lecturers from the Faculty of Engineering, Built Environment and Information Technology. The discussion sought to evaluate the contribution of ETs (Research objective 4) that could be harnessed in the knowledge management process (that is, the generation, transfer and retention of research knowledge) in selected CUT academic faculties worst affected by the departure of senior academics.

4.10.1.1   *Succession Planning*

Succession planning is a process of identifying and developing employees to fill key positions in an organisation (Durst & Wilhelm, 2012). These plans benefit organisations by making sure that the right people are in place at the right time. Also, succession plans improve employees' ability to respond to changes in the workplace. Organisations face the loss of intellectual property when employees retire from their jobs. This is confirmed in some of the sentiments expressed by the participants during the discussion, as noted in the following:

> *…there were criteria for promoting staff within the university, although the practice was not being viewed as succession planning per se. However, the promotion of staff was not proactively determined through a University system but was based on an individual need to contest for a higher vacant position* (FG: Lecturer, Beauty, African Female, 9/10/2017).

> *Another participant stated that under normal situations and staffing levels permitting, positions that fall vacant were filled by staff in an acting capacity after which if such a member of staff possessed minimum qualifications and exhibited enough experience to perform in that position, then he/she was appointed to be substantive in such a position* (FG: Lecturer, Goodwill, Indian Male, 9/10/2017).

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Furthermore, participants conceded that most people familiarised with most tasks in their units and acquired knowledge through serving in acting capacity to gain relevant experience. The study established that the heads of departments hold meetings at managerial level and rotate members of staff in the role of acting capacity in their absence, as a way of preparing them to take over responsibilities for higher positions although the practice was not being viewed as succession planning per se. This practice is consistent with Nemani's (2010) view that valuable transfer of knowledge occurs during managerial staff meetings, acting positions where younger managers learn from more experienced ones. Rothwell (2010), argues that KM within organisations is the heart of succession plans and further stresses that knowledge transfer through succession plans represents a proactive step towards employee empowerment. This consequently avoids of loss of knowledge by the organisation. Given the importance placed on succession planning (Stovel & Bontis, 2002), the findings at CUT clearly indicate that succession planning as a knowledge transfer technique is lacking.

4.10.1.2   Internal meetings and conferences

Besides the departmental meetings that the heads of departments hold with other junior staff, the study established that the high risk of knowledge loss was attributed to academics and researchers' culture of working in silos and claims about knowledge hoarding from experienced academics. The statements below are instructive:

> In meetings, for example, staff do not participate meaningfully. Instead of asking clarity seeking questions during meetings, staff prefers to hold mini-meetings after most departmental meetings to comment negatively about other staff's work, conduct and abilities (Stephan, Junior Lecturer, Stephan, African Male, Focus group, 9/10/2017).

> We interact with industry, transferring knowledge to the industry through Faculty advisory board meetings, Annual Research Seminar, consultancy to different stakeholders, government or industry (Ray: Senior Lecturer, Ray, African Male, Focus group, 9/10/2017).

Thus, some of the responses s from a focused group discussion revealed that some of the conversations held in meetings and other platforms, such as informal networking, informative phone calls and face-to-face discussions, were not documented anywhere. Whereas focused group discussion revealed that knowledge sharing and transfer is practical, especially during workshops, conferences and seminars, where experienced staff members share their knowledge in the form of paper presentations with peers, industry partners and government stakeholders. It is natural for academic institutions to share knowledge through seminars, conferences and

publications; thus, suggesting that there is a willingness to share knowledge (Cheng et al., 2009). Fullwood et al. (2013) are also of the view that there is an implicit knowledge sharing culture in universities evident in academics' engagement in knowledge sharing related to research, and teaching and learning activities. This is consistent with Levy (2011), who affirms that there is horizontal knowledge transfer where knowledge is shared and transferred among people in the same team/department/organisation.

4.11   KNOWLEDGE RETENTION

The Higher Education Institutions (HEIs) provide knowledge to the students, manage and archive the existing knowledge for future reference. The researcher assessed the functioning of the SharePoint intervention system to capture work processes for knowledge retention purposes. This was done in recognition of a potential knowledge loss due to failure to make use of alternative knowledge management platforms such as SharePoint at the institution.

4.11.1 Reflection – Final Phase

SharePoint intervention was originally designed to provide much more than just an information-sharing platform between individuals. Jedd (2009:35) notes that the platform, SharePoint, has multiple functions all rolled up into one compact platform. It was meant to provide an extensive search framework that connects people, processes and information across organisational boundaries in the higher education setting. This original function is evident in SharePoint's textual archives that retain trails of previous conversations between research experts and expert-novices, which other novices can access in future to augment their memory (that is, digital footprints). Finally, SharePoint provides sites where team members can share projects, hold discussions in forums, collaboratively author documents, and document their performance of assigned tasks.

The researcher infers that although users were aware of what SharePoint has to offer and how to use the features available through the training provided, the staff still prefer to use a local drive (L drive). As a result, the common practice used to alert staff about a typical document involves attaching the document to an email (rather than send a description of the folder location) or send a notification that meeting documents have been uploaded on L drive. An evaluation of the role of the SharePoint intervention system to capture work processes for knowledge retention purposes enabled the researcher to conclude that the high risk of knowledge loss was partly attributed to the minimal use of SharePoint as a collaborative knowledge generation platform.

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Findings from the Interviews

Wamundila and Ngulube (2011) affirm that knowledge can be retained in universities through various strategies such as mentoring and revisiting exit interviews practices to ensure that critical knowledge is retained. This process can be supported through documenting the processes through emerging technologies, i.e. SharePoint.

To evaluate the selected current intervention strategies for research knowledge management (i.e. knowledge generation, transfer and retention) used at CUT. (Research objective 1), the researcher conducted interviews as follows:

4.11.1.1   Exit interviews

One of the mission objectives of the CUT is to support the development and well-being of its employees (CUT Vision 2020, mission statement 4). It is the norm at the CUT, as in many other organisations, to conduct exit interviews for employees that would be leaving. The purpose of the exit interview process is to identify the factors, which may have influenced the employees' decision to leave the University or made CUT employees receptive to outside opportunities. The interviews also afford all exiting staff the opportunity to provide open, honest and constructive feedback, and to identify areas of good practice that can be promoted as well as identify turnover patterns (Integrated Talent Management Policy).

The exit interviews are not driven by knowledge retention goals. Sentiments expressed include the following:

> Here at CUT, exit interviews are more focused on identifying causal factors for high turnover, which may be useful for determining turnover trends. But the main challenge is that this process takes place as soon as possible after the Human Resources (HR) Department has received notice of the termination date from that particular staff member (Quinton, HR Consultant, Interview, 19/10/2017)*.*

> *"…I am not aware of policies that are in place to ensure the knowledge retention of retiring experts at CUT"* (Edwin, Professor, White Male, Focus group, 17/10/2017)*.*

The interview findings revealed that the exit process allows for a flow of feedback to the institution on elements such as the reasons why employees leave the institution, ways in which the institution can change or improve (Johns & Gorrick, 2016; Spain & Groysberg, 2016), leading to organisational effectiveness and engagement aspects. Ideally, institutions should not wait until experts threaten to leave or exit the organisation. Furthermore, the exit process will serve to

show gratitude to the departing employee for all efforts while in service of the institution, maintain goodwill and build ambassadors for the Central University of Technology.

The focused group findings indicated that the emerging technologies that would be relevant and appropriate for the management (i.e. capturing, documenting, transferring and retaining) of research knowledge among senior academics (Professors and Senior researchers) and emerging researchers at CUT are as follows:

4.11.1.2   Mentoring

Senior academics in the Faculty of Engineering, Built Environment and Information Technology are expected to mentor young academics as a process of formalised skills transfer to ensure a growing pool of potential candidates available for succession. The objective of these mentoring programmes is to familiarise new academic staff with the systems, processes and practices of the Faculty and CUT as an institution. Mentorship programmes encourage experienced faculty members with research skills to share their expertise with those who need assistance in developing their research competence. Mbeo and Rambe (2016) argue that at the core of improving research capacity is the provision of a connected interactive environment that allows for individual reflection and collaborative networking of research processes between experienced researchers and emerging researchers. The following excerpt bears testimony to this understanding:

> *When Prof Godfrey stepped down as an Executive Dean of the Faculty in 2008 and the faculty had different staff in an acting capacity until 2011 when a permanent appointment of the Dean was finally made. This clearly shows that there are no mentoring programmes in place to deal with such cases* (Rinah, Senior Lecturer, African male, Focus group discussion, 19/10/2017).

Mentoring entails the pairing of an experienced member of staff with a new employee in order to assist the new employee to acquire new knowledge and skills to operate (Dube and Ngulube, 2013). However, the findings from the focused group interviews revealed that the lack of effectiveness in mentoring programmes found expression in the lack of both monitoring mechanisms and a guiding framework when the pairing of mentors and mentees happens at the departmental level. There was a consensus among participants that the existing mentoring programmes, as a knowledge transfer and sharing technique, are not effective.

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The researcher reviewed the institutional documents, such as the Research and Development Plan 2014-2020, CUT Strategic Plan 2016-2020, policy for Integrated Performance Management System (IPerMS), Talent Management Strategy, faculty board minutes and departmental academic plans. The review focused on the use of SharePoint as an emerging technology relevant and appropriate for the management (i.e. capturing, documenting, transferring and retaining) of research knowledge among senior academics (professors and senior researchers) and emerging researchers at the CUT. In addition, this review revealed that the SharePoint platform is still used mainly for storing meeting documents and for providing comments or staff inputs on institutional policies since documents are still shared by email. A review of the CUT policy document, particularly Talent Management Strategy, revealed that the institution has a diverse workforce with unique combinations of qualifications, backgrounds, skills and experience. In spite of having to manage and maximise diversity, the CUT does not have a specific knowledge retention policy.

There is a fragmentation of policies on some knowledge retention issues as they are integrated into various human resource policies such as the policy for Integrated Performance Management System (IPerMS) and the Talent Management Strategy. The Talent Management Strategy helps in predicting talent supply and the interventions necessary to ensure talent availability when it is required. It also continues to monitor skilled employee turnover as a measure of retention. The policy for Integrated Performance Management System (IPerMS) is aimed at recruiting, developing and retaining employees with the requisite mindsets, knowledge and skills to achieve the university's transformation agenda. This policy generally provides an overview of the IPerMS-related issues and does not provide succinct information about the management of knowledge assets. Yet Liebowitz (2008) contends that knowledge retention strategies should be implemented or incorporated because of lack of clarity on the likely departure of experienced staff or when an employee can take early retirement. This is supported by Levy (2011), who proposed that knowledge retention should start immediately after an employee is recruited and must continue during employment until he or she retires or resigns. Failure to invest in people (talent) could lead to the loss of critical skills and undermine the richness of future talent.

4.12   CONCLUSION

This chapter provided an overview of the process of data analysis and research findings obtained via interviews and focused group interviews, document analysis, as well as researcher observations that emerged from the action research process. Knowledge management is the discipline of enabling individuals, teams and entire organisations to collectively and systematically

create, share and apply knowledge in order to achieve their objectives. An Emerging Technology (ET) such as SharePoint was presented as a potentially useful tool for collaborative knowledge generation and sharing among senior and junior academics at CUT. This is particularly important because the CUT is under pressure to retain and transfer its research knowledge to emerging academics, amid the aging, retiring and exiting of its experienced academics.

The researcher found out that the SharePoint platform is still used mainly for sharing meeting and policy documents. This is considered as an alternative to the common practice of attaching and sharing documents by email. Furthermore, some inconsistencies were noted with regard to knowledge management processes. For instance, the CUT was, at the time of conducting this study, in the process of introducing the development of the new Online Electronic Research Information Management System (RIMS) called CONVERIS. This occurred while the rest of the faculties were still trying to acclimatise with other software, such as an institutional repository and SharePoint platform, in a quest for the university to improve on the dissemination of research information and management.

Converis is a Research and Innovation Management System (RIMS), which can assemble professional profiles for a complete and up-to-date collection of all teaching, research, and service-related activities and provide an overview of all accomplishments using advanced analytic reports of outputs and impact. This means that the CUT is in the process of using a comprehensive solution that will enable proactive management of information and workflows across the research and innovation lifecycle through Converis. However, it remains unclear whether this migration will result in the abandoning of SharePoint or its complementation with Converis.

The next chapter presents a summary of the study; the conclusions reached, suitable recommendations and the limitations to this study.

CHAPTER 5: CONCLUSION AND RECOMMENDATIONS

5.1   INTRODUCTION

The previous chapter discussed the findings of the study through qualitative methods. This chapter concludes the study by summarising the research findings, providing conclusions and suggesting recommendations for future research studies.

5.2   CONCLUSION BASED ON LITERATURE

Management of Knowledge in any field is very crucial for organisations. The situation is even significant in Higher Education Institutions where retirements, resignations and restructuring processes lead to knowledge drain, particularly that of the tacit knowledge that resides in the minds of the people. This results in a loss of useful knowledge from the organisation (Delen, and Al-Hawamdeh, 2009). Thus, the use of a collaborative technology (SharePoint) platform with knowledge management can prove to be an important factor for shaping the generation, sharing, transferring, storing and retaining of the relevant knowledge for higher education institutions, and enable the transformation of tacit knowledge into explicit knowledge.

5.2.1   Knowledge Generation

Knowledge generation requires the knower to possess information sourcing and synthesis abilities to ensure seamless integration and conversion of information into knowledge. The synthesis and processing of the information collected are considered as critical steps in the creation phase of the knowledge management theory (Nonaka, Byosiere, Borucki & Noboru Konno, 1994; Agile Innovation, 2010). However, an experienced researcher's synthesis of knowledge may be a consequence of individual conceptualisation and reflection, while for the novice researcher, interaction with the experienced knower is key to her ability to generate new knowledge. The synthesis of research knowledge may be an outcome of dialectic intercourse in temporary and multi-faceted dialogues where participants can express their own ideas freely and openly, affirming and negating these in mutually constructive ways (Agile Innovation, 2010). Knowledge creation also depends on the enactment, and retrievability of the tacit knowledge. The usability, accessibility and familiarity of low cost, ubiquitous, threshold technologies, such as SharePoint, to the novice and the experienced researcher are also pivotal to knowledge creation and overcoming of organisational amnesia.

5.2.2 Knowledge Sharing

The findings indicated that staff members tended to share knowledge more readily among individuals within the same racial groups than across departments (research objective 2). A possible explanation for this could be a lack of inter-faculty or inter-departmental collaboration where staff essentially operate in silos, lack of knowledge extraction from departing employees, lack of staff participation in knowledge sharing and scattered knowledge within the Departments. This notion could be supported by the fact that the CUT was formerly known as Technikon Free State, a predominantly White university, and thus most respondents regard sharing of knowledge across cultures as very rare and knowledge hoarding as a barrier to knowledge sharing. Respondents might refrain from sharing the knowledge that might benefit the careers of other racial groups.

5.2.3 Knowledge Transfer

The transfer of research knowledge demands that senior academics/researchers desist from hiding knowledge by increasing the levels of knowledge accessibility to the novices. The journey to the externalisation of knowledge should support a culture that prohibits knowledge hiding within and beyond the organisation (Esterhuizen et al., 2012). If tacit knowledge remains unspoken and hidden (McInerney, 2002), such knowledge, which emerges from the assumptions and expertise of individuals that develop over the years, may never be documented or recorded (Martins & Martins, 2011). The transfer of knowledge also demands alignment of the technology in use, the transfer strategy and the individuals affecting such transfer. Therefore, co-operating individuals should draw on available, low-cost technologies, such as SharePoint, to develop an effective knowledge transfer strategy that draws on context-relevant-content in situated learning environments. The dominance of the SharePoint usage in the Faculty of Engineering and Information Technology than into other faculties compels the need for the expansion of SharePoint practices from one faculty to other faculties to foster a transfer and retention of knowledge at the institutional level.

5.2.4 Knowledge Retention

The study pointed out that exit interviews at CUT are more focused on identifying causal factors for high turnover as the Departments have no specific processes used to capture and preserve organisational knowledge. It is the norm at CUT, as in many other organisations, that when

employees resign or leave, they partake an exit interview. Once again, these interviews are not driven by knowledge retention goals. They are more focused on identifying causal factors for high staff turnover, which may be useful for determining turnover trends. For knowledge retention purposes, exit interviews need to ensure that critical tacit knowledge is leveraged, harvested and retained through personification or codification approaches.

5.3 CONCLUSION BASED ON EMPIRICAL EVIDENCE

In addressing the question on the *research gaps inherent in the CUT knowledge production strategies that have resulted in the loss of expert research knowledge at CUT (Research question 2)*, the researcher conducted interviews with Heads of Departments and Associate Professors, to examine the high risk of knowledge loss with retired and leaving senior academics.

5.3.1 Silo mentality

In paragraph 4.3.1.1, the respondent, Ernest, highlighted that one of the major constraints at the CUT is the prevalence of knowledge hoarding and staff working in silos, which resulted in low collaboration between staff. In addition, Donald indicated that staff tend to share knowledge when they felt like doing so and experts could leave the institution at any time with their knowledge and insights. The findings, based on the interviews conducted, also indicated that staff members tended to share knowledge more readily among individuals within the same racial groups than across departments. Therefore, the conclusion is that CUT, formerly known as a Technikon Free State and a predominantly White university, is dominated with respondents who do not share knowledge across cultures and knowledge hoarding, which are both barriers to sharing the knowledge that might benefit the careers of others racial groups.

5.3.2 External Consultants

In paragraph 4.3.1.2, the respondent, Billy, highlighted that as Engineers, we create knowledge through our consultation with industry experts. Steve highlighted that academics interact with people and our stakeholders through advisory meetings with external stakeholders, guest lecturers, workshops, seminars and conferences. The findings indicated that the pressure to deliver the curriculum in turnaround time to sufficiently prepare students for exams, the large numbers of novice researchers at the institutions, and the lack of knowledge on the practical application of research-led teaching, makes experienced professor's aspirations a mirage. It can

then be argued that the difficulty in implementing research-informed and research-led teaching is one of the knowledge gaps that undermine the generation and transfer of knowledge in classrooms in this faculty at the CUT.

5.3.3 Restructuring exercise

The focus group discussion indicated that the *senior and executive management restructuring* exercise (refer to paragraph 4.3.1.3) that took place in 2007 and was concluded in 2011 resulted in the freezing of outlier salaries (top-notch salaries which were anomalies) that had the unintended effects of pushing some senior highly experienced academics out of academia. Various academic staff in the Faculty of Engineering, Built Environment and Information Technology are specialists in their specific disciplines, hence some opted for better salary packages from industry and this resulted in the loss of expert research knowledge at CUT. In addition, the low salaries that are generally offered to active and seasoned researchers have already forced many researchers to leave universities and this may prevent future generations of scholars from joining academia.

Through the focused group discussion, the researcher sought to *evaluate the selected current intervention strategies for research knowledge management (i.e. knowledge generation, transfer and retention) used at CUT to share knowledge (Research question 1).* In addressing this question, the researcher established the following issues discussed in subsequent sections.
For CUT to be able to spread its operational knowledge, the following knowledge transfer practices were reported on:

5.3.4 Succession planning

In paragraph 4.10.1.1, Goodwill stated that *under normal situations and staffing levels permitting, positions that fall vacant were filled by staff in an acting capacity after which if such a member of staff possessed minimum qualifications and exhibited enough experience to perform in that position, then he/she was appointed to be substantive in such a position.* A number of benefits are indeed associated with the above knowledge transfer practices. By considering the above-recommended practices, CUT stands to benefit in the following ways: Rotation of employees shall expose staff to the various operations and environments at CUT and as such the memory for operational knowledge shall be greatly enhanced; as succession planning will help to proactively

identify potential replacements for attrition incurred in areas where continuity is a must for operational sustenance. The above-focused group findings revealed that succession planning as a formal knowledge transfer technique is lacking at CUT. These participants conceded that most people familiarised with most tasks in their units and acquired knowledge through serving in acting capacity to gain relevant experience. It is concluded that heads of departments hold meetings at managerial level and also rotate members of staff in the role of acting capacity in their absence, as a way of preparing them to take over responsibilities for higher positions although the practice was not being viewed as succession planning per se, therefore succession planning as a knowledge transfer technique is lacking.

5.3.5   Mentorship

In paragraph 4.11.1.2, From the focused group discussion, Rinah said: *When Prof Godfrey stepped down as an Executive Dean of the Faculty in 2008 and the faculty had different staff in an acting capacity until 2011 when a permanent appointment of the Dean was finally made.* One of the ways to avoid collective loss of organisational memory is to identify the expertise and skills of staff and capture it through training and mentorship as a means of enhancing the intellectual capacity of less experienced staff. Mentorship shall serve as direct injection of required operational knowledge for employees. From the focused group findings, it emerged that the lack of effectiveness in mentoring programmes found expression in lack of monitoring mechanisms and a guiding framework when the pairing of mentors and mentees happens at the departmental level. It is concluded that the existing mentoring programmes as a knowledge transfer and sharing technique are not effective.

In addressing the question of what is the nature of emerging technologies (ETs) that could be harnessed in the research knowledge management process (that is, the generation, transfer and retention of research knowledge) in selected CUT academic faculties worst affected by the departure of senior academics (Research question 3).

5.3.6   Knowledge repositories

In view of the current challenges of the L drive regarding knowledge generation especially its use as an information repository and its inaccessibility to staff when they are off-campus (paragraph 4.3.1), the researcher introduced SharePoint as a technology intervention for the generation, retention and transfer of research knowledge to junior academics and researchers unconstrained

by geographical location and ultimately, to enhance staff's interest in increasing research outputs at CUT.

Although the entire Faculty investigated have implemented SharePoint within their Departments, the investigations indicated that the entire Faculty has implemented SharePoint within its Departments, these Departments are not using SharePoint for collaboration, communication nor as a knowledge sharing tool for senior academics at CUT. Instead, SharePoint is mainly used for document management system, primarily to upload meeting documents such as agenda and minutes used by the faculty.

Therefore, the recommendation is that organisational knowledge be stored in the knowledge repository as a central resource. This will result in the availability of knowledge anywhere, anytime. Past experiences and data on failures and mistakes, if captured and stored, will help in the application of corrective and preventive measures to the newer domains. In addition, a centralised approach towards storage of organisational knowledge provides an opportunity for collaborative work environment leading to better products and services. It is essential for HEIs to capture this knowledge through digitisation, documentation and storage in knowledge repositories for future generations of scholars and researchers.

Research Question 4: What is the contribution of emerging technologies (ETs) that could be harnessed in the research knowledge management process (that is, the generation, transfer and retention of research knowledge) in selected CUT academic faculties worst affected by the departure of senior academics?

5.3.7   Exit Interviews

In paragraph 4.11.1.1, Quinton argues that "But the main challenge is that this process takes place as soon as possible after the Human Resources (HR) Department has received notice of the termination date from that particular staff member." Many organisations will conduct exit interviews before the employee leaves. The researcher argues that exit interviews can provide a snapshot of the knowledge, but the research shows that by capturing knowledge during the employee's tenure, instead of a mad rush at the end, a greater likelihood for success exists in terms of retaining knowledge at different stages of the employee's career. Questions that the employee had early in his/her career may not even be remembered at later stages; thus, the

ongoing capture of knowledge from day one may be useful to others instead of waiting until the end. It is concluded that exit interviews are more focused on identifying causal factors for high turnover, which may be useful for determining turnover trends; therefore, they are not driven by knowledge retention goals.

5.3.8   Internal meetings and conferences

In paragraph 4.10.1.2, through focused group discussion, Ray echoed that "w*e interact with industry, transferring knowledge to the industry through Faculty advisory board meetings, Annual Research Seminar, consultancy to different stakeholders, government or industry".* The focused group discussion revealed that knowledge sharing and transfer is practical, especially during workshops, conferences and seminars where experienced staff members share their knowledge in the form of paper presentations with peers, industry partners and government stakeholders. The researcher concluded that although it is a natural activity of academic institutions, in the form of seminars, conferences and publications, suggesting that there should be a willingness on the part of employees who possess it to share.

In addressing Research Question 5 on *which emerging technologies would be relevant and appropriate for the management (i.e. capturing, documentation, transfer and retention) of such research knowledge?* The following issues were raised*:*

5.3.9   Lack of time to share knowledge

The researcher also conducted interviews with Junior lecturers and Associate Professors. In paragraph 4.4.1.1, the respondent, Max, highlighted that "teaching occupies most of my time; eventually, there is not enough time for me to share knowledge or conduct of research". Lydia also highlighted that along with this heavy teaching workload; we are still expected to attend a lot of departmental meetings for setting the timetable, allocation of subjects, invigilation of assessments and other administrative issues. The findings based on the interviews conducted suggest that majority of the junior academic staff spend most of their time in teaching and did not have adequate time to conduct research or involve themselves in research-related activities where experienced researchers could collaborate and share information with novice staff. While there were a variety of information and communication technologies that were at the academics' disposal such as collaborative platforms (wikis, blogs), digital content repositories (e.g. Google docs, Google Drive, Dropbox), academic sites (such as Research-gate, Academia.edu, Linked-in) and application software (such as SharePoint), academics mainly used them to support their teaching to students as opposed to using them for knowledge sharing. It is concluded that there

is an increased teaching workload on academics which means they do not have enough time to share knowledge or either have much time to carry out research themselves as they used to.

5.4 RECOMMENDATIONS FOR POLICY

5.4.1 Institutionalisation of policy on knowledge management

Though the KM practice is beneficial to all institutes, including academics, awareness of its development is yet to be institutionalised by university authorities. There is a need to create a clear knowledge management policy that would create and deep a knowledge-sharing culture amongst the staff and students. This would contribute to eliminating reluctance in sharing information across diverse racial groups and weariness about senior academics sharing knowledge with subordinates and junior staff.

5.4.2 Clear policy on succession planning

In view of the drift of senior academics from the Faculty to the private sector and the prevalence of succession gaps arising from their departure, CUT needs to establish a coherent and effective succession planning policy. This can be implemented through shadowing senior academics by junior or middle-ranked academics, the research training on high-impact publishing and use of highly experienced visiting professors to share research expertise and to scale up the upward mobility of junior academics into positions of influence. This will also contribute directly to their maturation into seasoned academics.

5.4.3 Inter-cultural research collaboration

The persistence of silo publishing and intra-racial collaboration when publishing in accredited journals implies that CUT must introduce policies that serve to entrench inter-cultural research collaboration among academics at the institution. The policies that serve to incentivise inter-cultural collaboration may also be instituted to deepen inter-cultural dialogue and promote knowledge sharing among academics from diverse racial groups. This will serve to discourage information hoarding and advance knowledge sharing between senior academics and novice academics. A mentoring process in which senior academics are mandated to be paired with junior academics who are intrigued by conducting world-class research and desire collaboration will need to be instituted to advanced multi-level and inter-racial research collaboration.

5.4.4 Emerging technology enhancement and utilisation policy

In view of the underutilisation of emerging technologies at CUT, a clear policy on how such technologies such as SharePoint can be institutionalised, enhanced and utilised would be necessary. The policy may need to provide clear guidelines on how learning designers can tap into exemplars of effective use of SharePoint and other technologies and then use them for the wider roll-out of such technologies across campus. This will increase the rate and extent of use of emerging technologies and this could spill over into research collaboration.

5.5   RECOMMENDATION FOR PRACTICE

5.5.1   Train-the-trainer-technology programme

Given that there was insufficient evidence to demonstrate that the adoption of SharePoint increased after the training of academic leadership (i.e., HODs, experienced academics and research managers) in the faculty, there is a need for a grassroot initiative that leverages the appropriation of this technology at the faculty level. Some training and staff development covering the academic use of SharePoint (e.g. use of research collaboration, knowledge sharing, teaching, learning) would be necessary. An approach in which one of the trained staff members becomes a resource person in future training must be adopted so that knowledge acquired from previous training is not lost in the process.

5.5.2   Capturing tacit knowledge at the point of its creation

Given the difficulty of capturing tacit knowledge at the point of its production and the reluctance of senior academics to share research knowledge, users of this technology may need to draw on trails of artefacts of senior academics such as their work-in-progress papers, working papers, informal conversations and informal discussions on SharePoint as artefacts of assimilating research knowledge. These artefacts may be readily available if senior academics are encouraged to use SharePoint as a knowledge repository where they deposit their work in progress papers.

5.5.3   Knowledge champions

The fact that there was a massive uptake of SharePoint when one thought the leader was still the Dean of the Faculty before his promotion to an executive management level and that such use declined upon his departure, demonstrates the importance of having key knowledgeable people

serving as knowledge champions. These resource persons can champion and promote the use of specific technologies for academic purposes through online announcements via Blackboard, workshops and information sharing sessions.

5.5.4   A work rationalisation model

Since one of the knowledge management challenges noted by junior staff was heavy teaching workload, the recruitment of teaching assistants, lecturing assistants and tutors would ideally ease this load and perhaps contribute to increased research productivity by junior staff. However, due to the financial implications of recruiting such staff in the wake of the "#fees -must-fall-campaigns" which limited the financial resources of the university, this option remains unpopular among senior executives. Therefore, a work rationalisation model where the volume of the workload is proportional to the rank of the academic would be more desirable even though it may generate some resistance from senior academics.

5.5.5   Knowledge-sharing sessions (KSS)

CUT conducts knowledge-sharing sessions (KSS), where executives and senior managers participate and share perspectives on issues of management and administration. The researcher argues that organisational communication structures could include knowledge-sharing sessions not only for senior management but also for junior staff at the lower levels of the organisation. Organisational communication not only involves communication from top management but communication among staff members who, in turn, shape the way employees communicate with customers and other external stakeholders as well. This necessitates employees' knowing the key knowledge assets of the organisation.

5.5.6   Proactive measures through human resources processes

CUT should not wait until knowledge assets threaten to leave or exit. Instead of being reactive, institutions should be proactive through human resources and other appropriate knowledge management strategies. These include purposeful recruitment and hiring based on identified risks and threats that are likely to impact on critical knowledge assets. If the process is strategically and deliberately managed, institutions can avert knowledge attrition and maintain a competitive advantage.

5.6 THEORETICAL CONTRIBUTION

Drawing on Nonaka & Takeuchi's (1995) argument on the capacity of an organisation to create new knowledge, disseminate it throughout the organization and embody it in products, services and systems, one could argue that universities have significant opportunities to apply knowledge management practices to support every part of their mission—from education to public service to research. An institution-wide approach to KM can lead to exponential improvements in sharing explicit and tacit knowledge and the subsequent surge benefits. Based on the findings of the study relating to the needs for knowledge generation and sharing between senior academics and novices, existing gaps identified at each of the four stages of knowledge management, the individual activities evident at each stage of the knowledge management process, the facilitative role of emerging technology in knowledge production, sharing and retention, and the revised knowledge management model was developed (see Figure 5.1). This model also takes cognisance of the reality that knowledge management at university unfolds in a context characterised by economic, social-political factors and is regulated by government policies on HE management.

Figure 5.1:   Proposed Knowledge Management Framework
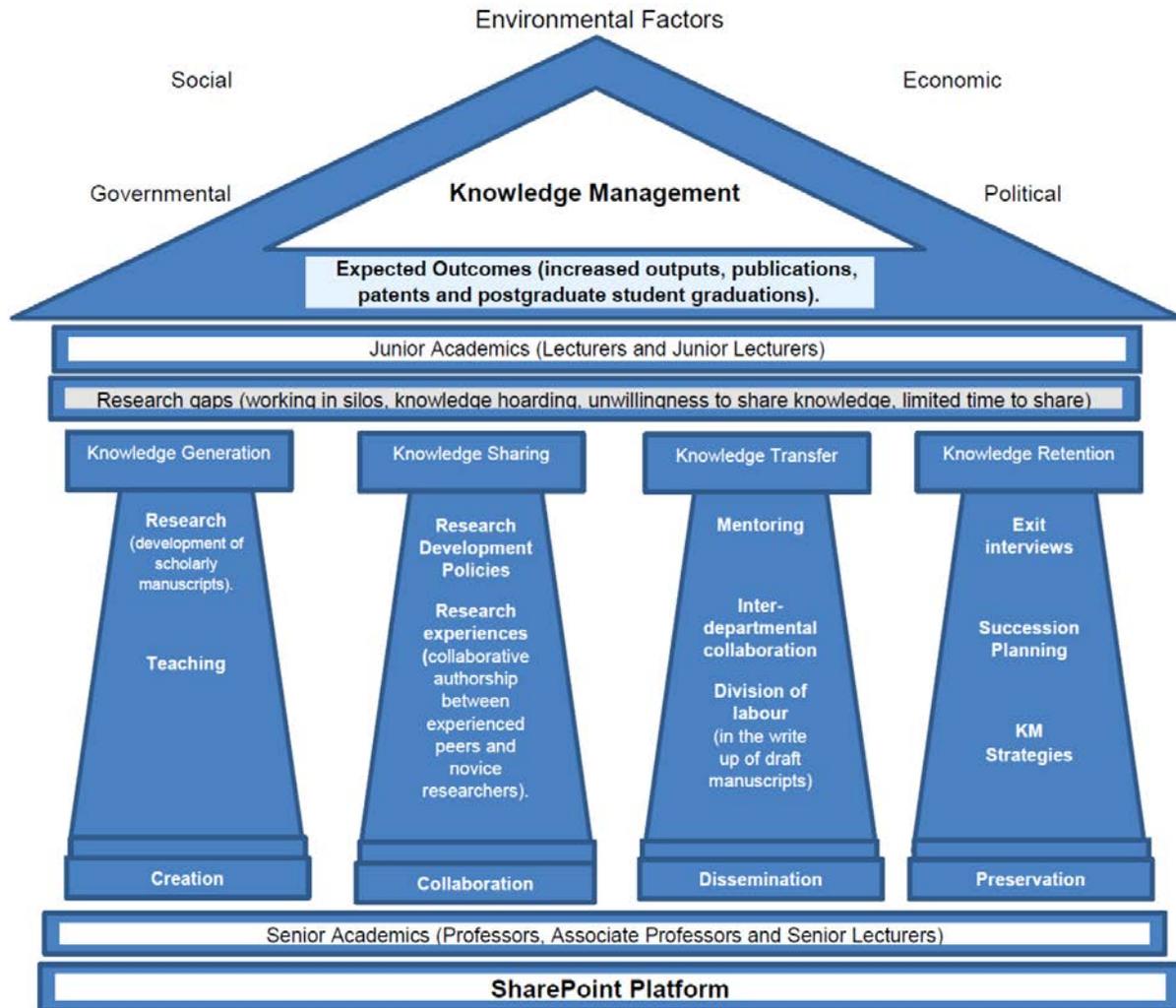
(Source: Author's compilation)

The Model is a significant revision of the model proposed in Chapter 1 in various ways. First, the revised model appreciates that SharePoint is one of the critical vehicles through which knowledge management processes (i.e. knowledge generation, knowledge sharing, knowledge transfer and knowledge retention) could unfold between experienced academics and novices (i.e. vertical integration of knowledge). Second, the model appreciates the respective activities embedded in each knowledge management stage and how these activities seem distinct in theory yet are actually integrated in practice. Third, the model demonstrates the knowledge gaps that may be addressed through using SharePoint to fulfil knowledge management processes. Fourth, it demonstrates the research outputs that could be generated if the research gaps are breached.

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Fifth, it also demonstrates the reality that research and knowledge management at university does not unfold in a vacuum but rather is mediated by government regulation and economic (e.g. constrained research budgets, funding models), social (e.g. massification of higher education, new generational cohorts of students) and political (political pressure evident in the drive towards equity, equality and social justice) factors. Lastly, the model demonstrates that universities are expected not only to generate but also to retain and transfer knowledge to society. Their ability to communicate, share and innovate is critical in order to meet the challenges of the knowledge society.

There is a need for meaningful change in the governance and leadership of the universities not only at the level of discourse but also of practice if they want to survive the present competitive and fast-changing environment with regard to effective knowledge management. Addressing the technologic, social and economic challenges demands universities to not only transform their knowledge production approaches to meet the demands of the knowledge society but rather to consider knowledge transfer and retention processes if they are to survive in this complex knowledge-based society.

5.7   LIMITATION OF STUDY

In this study, the permanent staff were the target population to be investigated. The sample of staff from the Faculty of Engineering, Built Environment and Information Technology was on the basis that SharePoint is also a low cost, inexpensive, low threshold technology, which is easily accessible to CUT academic community's (lecturers and students) resource-constrained contexts. Therefore, the study did not involve students as the researcher noticed that at the time of collecting data, students were writing their compulsory main test and year-end assessments which complicated the meeting of appointments set with the researcher as the study would be interesting to compare educators and student views on SharePoint usage.

Additionally, this study focused on the promotion of knowledge management through the SharePoint platform and the application of Action Research Cycles at the level of conception and implementation of this technology, to show how it was actually applied-with detailed explanations. Aidinopoulou and Sampson (2017) argue that Action Research involves a cyclical process that allows the researcher to reflect on each cycle and discover problems that occur and gives the researcher an opportunity to re-design. The challenge with the use of Action Research can be that, reflexivity can also be confused with the generation of thick descriptions that may not necessarily lead to reflexivity. Another limitation is that the study was being conducted right in the

middle of an introduction of a new Online Electronic Research Information Management System (RIMS) called Converis while the rest of the faculties are still trying to familiarise themselves with other institutional repository, SharePoint platform. As a result, the study did not draw on experiences of other faculties on the full implementation cycle, which includes the refinement of the SharePoint intervention. Lastly, perhaps the pairing of a survey research design with qualitative methodologies already used in this study could have provided a broader picture of institutional adoption of SharePoint including the knowledge management challenges experienced with its usage. This would also have allowed for comparative analysis of its usage and reflection on associated knowledge management challenges experienced across the university.

5.8   IMPLICATION FOR FUTURE RESEARCH

The research that was conducted revealed that some areas could offer opportunities for further research in the field of knowledge retention and knowledge sharing. These areas are as follows:

1. An area for further research that was not researched in depth in this study was the type of knowledge retention strategies that could be implemented to retain tacit knowledge and the extent to which knowledge retention approaches have been implemented in South African higher education institutions.
2. Future studies may need to broaden the SharePoint platform to include other Faculties at CUT as it is currently being used in one faculty under the study to determine causal factors obstructing knowledge sharing in the Faculty. Without concrete evidence of the causal factors, one can only speculate about what challenges novice researchers face. For example, the heavy teaching loads for those in lower-level categories (novices) compared to higher categories (experienced professoriate).

5.9   CONCLUDING REMARKS

In conclusion, universities are expected not only to generate but also to retain and transfer knowledge to society. Their ability to communicate, share and innovate is critical in order to meet the challenges of the knowledge society. There is a need for meaningful change in the governance and leadership of the universities not only at the level of discourse but also of practice if they want to survive the present competitive and fast-changing environment. Addressing the technologic, social and economic challenges demands universities to not only transform their knowledge

production approaches to meet the demands of the knowledge society but rather to consider knowledge transfer and retention processes if they are to survive in this complex knowledge-based society.

The researcher noted some inconsistencies with regard to knowledge management processes. For instance, SharePoint is currently used by staff members in one Faculty under study and has not been rolled out to other faculties. Yet CUT has already introduced new Online Electronic Research Information Management System (RIMS) called CONVERIS while the rest of the faculties are still trying to familiarise themselves with other institutional repository and SharePoint platform. The challenge, therefore, is the introduction of multiple technologies before staff members get acclimatised to their current technologies in use. It is, therefore, highly recommended that CUT must stick with specific technologies and promote their wider roll out for a considerable number of years before transitioning to different technologies.

5.10   SUMMARY

The culture of knowledge hiding and the subtle reluctance of senior academics to mentor novices could be addressed through the strict enforcement of a technology-enhanced knowledge management framework be constituted to foster the transfer of tacit research knowledge from senior academics to the young generation of academics at the Central University of Technology, Free State. However, if employees are not willing to share and pass along the knowledge across the organisation, the effort of knowledge management will fail. In a nutshell, knowledge sharing is a people-process. More consideration should be given to understand how individuals react to internal as well as external factors in making their decision as to whether to participate in the sharing activities.

ANNEXURE A: A SHORT BIOGRAPHICAL STATEMENT

Mpho Agnes Mbeo (nèe Maiane) is the Faculty Officer in the Faculty of Engineering, Built Environment and Information Technology (FEBIT) at the Central University of Technology, Free State (CUT), South Africa. She successfully completed and graduated with NDip in Office Management and Technology (*Cum Laude*) and two BTech degrees as follows: BTech in Office Management and Technology (*Cum Laude*) and BTech: Project Management at the CUT. She is pursuing her Master's degree in Business Administration at the same university. She won the *Vice-Chancellor's Excellence Award for Middle-Management for the first time under new Support Staff Category*. It is worth noting that upon successful completion of her Masters, in the history of the CUT, Mpho will be the **first black female support staff** to achieve Master's degree in the Faculty of Engineering, Built Environment and Information Technology.

Mpho Agnes Mbeo has exceptional research skills, unparalleled diligence and sincere devotion to conduct research at the postgraduate level. She was awarded *Stars of Academia, Research and Support (SoARS) Fellowship* at CUT. Research areas include knowledge management, emerging technologies, management and leadership of higher education institutions, research culture, publication and outputs. She published the following distinguished scientific research outputs from her Master's study:

Rambe, P. and **Mbeo, M.A.** (2017). Technology-Enhanced Knowledge Management Framework for Retaining Research Knowledge among University Academics. *Journal of Economics and Behavioural Studies*, 9(1), pp. 189-206

Mbeo, M. and Rambe, P. (2016). Assessing the feasibility of a knowledge management model for research knowledge retention at a university of technology. In: A. Strasheim, A. Nel and E. Koekemoer (Eds.). *Proceedings of the 28th Annual Conference of the Southern African Institute of Management Scientists*, (pp. 606-616), 4 – 7 September 2016, University of Pretoria.

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Appendix B: Permission to conduct Interviews and Focused Group Discussions

Central University of
Technology, Free State

■ Institutional Planning and Quality Enhancement

MRS MPHO AGNES MBEO

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HEIDEDAL
BLOEMFONTEIN
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mmbeo@cut.ac.za

PERMISSION FOR MRS MPHO AGNES MBEO TO CONDUCT INTERVIEWS AND FOCUSED GROUP
DISCUSSIONS WITH THE CENTRAL UNIVERSITY OF TECHNOLOGY, FREE STATE (CUT)
PERMANENT ACADEMIC STAFF AT BOTH BLOEMFONTEIN AND WELKOM CAMPUSES FOR HER
MASTER STUDY ENTITLED: *"ASSESSING THE FEASIBILITY OF EMERGING TECHNOLOGIES AS A
RESEARCH KNOWLEDGE MANAGEMENT TOOL IN ACADEMIA: A CASE STUDY IN A SOUTH
AFRICAN CONTEXT."*

Dear Mrs Mpho Agnes Mbeo

This is to confirm that you have been granted permission to conduct interviews and focused group
discussions with The Central University of Technology, Free State (CUT) permanent academic staff at both
Bloemfontein and Welkom Campuses for her master study entitled: *"Assessing the feasibility of Emerging
Technologies as a research knowledge management tool in academia: A case study in a South African
context."*

The conditions of the conditional permission are:
* The survey will not interrupt any of the official activities at the CUT;
* You will supply us with the copy of your report;
* The cost of all related activities will be covered by yourself;
* Recruitment of participants is the sole responsibility of yourself;
* Voluntary nature of the potential participant's decision to consent to participate should be strictly
  observed;
* You should not disclose a potential participant's decision to participate or otherwise to any other party;
* Permission does not compel, in any sense, participation of staff members or students in your survey.
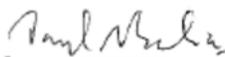
DIRECTOR: INSTITUTIONAL PLANNING AND QUALITY ENHANCEMENT
DR DM BALIA
18 September 2017

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Appendix C: Cover letter

Central University of Technology, Free State

2017-09-20

Dear Research Participant,

REQUEST FOR ASSISTANCE TO PARTICIPATE IN AN ACADEMIC RESEARCH STUDY

My name is Mpho Agnes Mbeo (Student number: 20244134) and I am conducting a case study covering the Faculty of Engineering and Information Technology as a requirement for the completion of my Masters study in Business Administration supervised by Prof. Patient Rambe. The department conferring the degree is the Department of Business Support Studies at the Central University of Technology, Free State, Bloemfontein.

You are invited to participate in an academic research study, entitled: *"Assessing the feasibility of Emerging Technologies as a research knowledge management tool in academia: A case study in a South African context."*

The study aims at proposing and assessing the feasibility of a knowledge management approach founded on the utilisation of emerging technologies for knowledge generation, retention and transfer in a South African higher education context. This knowledge management approach is geared at ameliorating the risk of losing the prime research knowledge of highly experienced ageing professoriate upon retirement, transfer or resignations.

The following ethical standards will be adhered to:

- The employees who participate in the study will be informed of the purpose of the study and that no financial benefit will accrue from their active participation.

- This study involves an anonymous interview and focused groups. The information provided shall not attach any names and shall be treated with high level of confidentiality.

- Employees are therefore assured that their views as part of the content of the interview session shall not be used in a manner that might cause harm, discriminate, victimise, or damage their character and reputation as an individual and professional other purpose than academic research and dissertation.

- Employee's participation is voluntary, and they are free to withdraw from the process at any point during the interview process.

- Employees should be free to ask any questions for clarity where they feel uncertain during participation.

Please find enclosed the interview questions.

Thank you.

Mrs Mpho Agnes Mbeo
Faculty Officer: Engineering and Information Technology

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Appendix D: Interviews and Focus Groups

INSTRUCTIONS:

1. Write in the spaces provided, if space is not enough, please make use of a separate paper.
2. Please indicate your response by ticking (X) in an appropriate space as provided.

SECTION A: PERSONAL DETAILS

    a. How long have you been employed at CUT? _____

    b. Position: _____

    c. Age range:

- 25-30
- 30-35
- 35-40
- 40-45
- 45-50
- 50+

    d. Gender: _____

    e. Educational level: _____

SECTION B: INTERVIEW INSTRUMENT FOR DATA COLLECTION

Knowledge Management Strategies

What are the current knowledge management strategies (that is, strategies for the generation, transfer and retention of research knowledge) being adopted at CUT?

1. Can you please describe the strategies which CUT has put in place to deal with the potential knowledge loss and to ensure the knowledge retention of retiring experts at CUT? How effective have these strategies been in ensuring the same?

_____

_____

_____

2. What strategies has CUT instituted since 2010 to encourage knowledge sharing amongst senior and junior staff? How effective have they been in your view? Please elaborate.

_____

_____

_____

3. What policies have been implemented by CUT to reward those who are conducting research? How adequate are these policies in increasing academics' enthusiasm to research and share their work publicly (e.g. through prestigious research seminars and though public online platforms e.g. Academia.edu, research-gate or SharePoint) and also rewarding them accordingly? Please describe and elaborate.

_____

_____

_____

4. How does CUT's human resource (HR) strategy address the issue of bringing people together so that they can build informal networks?

_____

_____

_____

Knowledge Production

Which research gaps are inherent in CUT knowledge production strategies that have resulted in the loss of expert research knowledge at CUT?

5. Is institution's perceived dependence on research output of few, seasoned academics (mostly the aging professoriate in their 60s) a concern to you? Please elaborate.

_____

_____

_____

6. How has CUT top management strategically responded to the threats and opportunities posed by retiring employees? What specific strategies respond directly and indirectly to this phenomenon?

_____

_____

_____

7. What evidence of inter-generational and trans-generational transfer of research knowledge do we have as an institution to sustain the necessary research outputs at CUT in the long term?

_____

_____

_____

8. Is it a correct observation that CUT tends to value research output quality at the expense of quantity (e.g. high impact journals, citations, etc., and H index)? What needs to be done to improve the quality and quantity of research outputs? Elaborate your answer.

_____

_____

_____

Knowledge creation

9. What challenges are hindering the proper creation of knowledge in your department? Elaborate your answer.

_____

_____

_____

Knowledge transfer

What is the nature of emerging technologies (ETs) that could be harnessed in the research knowledge management process (that is, the generation, transfer and retention of research knowledge) in selected CUT academic faculties worst affected by the departure of senior academics?

10. Which different technologies are currently being used for knowledge management (e.g. knowledge generation, transfer and retention) in the departments worst affect by the departure of senior academics?

_____

_____

_____

11. What are the main characteristics /traits of the technologies that your department/ faculty has employed for the knowledge transfer in your department?

_____

_____

_____

12. Is there any evidence amongst the employees at CUT that suggests that their sense of entitlement to their knowledge and this, complicating its sharing t? Elaborate your answer.

_____

_____

_____

Knowledge Retention

13. What do you consider to be barriers to successful knowledge retention initiatives in the department?

    _____

    _____

    _____

14. Is there any strategy so far at CUT of recording the know-how of the members who leave the organisation, besides exit interview?

    _____

    _____

    _____

Knowledge Generation

What is the contribution of emerging technologies (ETs) that could be harnessed in the research knowledge management process (that is, the generation, transfer and retention of research knowledge) in selected CUT academic faculties worst affected by the departure of senior academics?

15. How effective are these technologies in the creation, sharing, retention and transfer of knowledge in these departments? Is there any evidence of the impact of these technologies in knowledge management in any particular department. Elaborate your answer.

    _____

    _____

    _____

Knowledge Sharing

Which emerging technologies would be relevant and appropriate for the management (i.e., capturing, documentation, transfer and retention) of such research knowledge?

16. Highlight the emerging technologies which your department is currently using for the management (i.e. capturing, documentation, transfer and retention) of sharing research knowledge?

    _____

    _____

    _____

17. Which interactive technologies your department is currently using for the management (i.e., capturing, documentation, transfer and retention) of research knowledge?

    _____

    _____

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_____

18. Which communicative technologies your department is currently using for the management (i.e., capturing, documentation, transfer and retention) of research knowledge?

_____

_____

_____

SharePoint

19. *How effective are ETs such as SharePoint for knowledge generation, transfer and retention in the management of research knowledge at CUT?*

_____

_____

_____

Information Technology (IT) infrastructure support

20. *How can an ET-mediated knowledge management approach be constituted to manage (i.e. capture or document, transfer and retain) research knowledge and expertise of senior academics at CUT?*

_____

_____

_____

THANK YOU.