Constructing Knowledge Management Capacity and Forms of Capital:

A Qualitative, Ethnographic, Exploratory Case Study of an

Australian Regional University Education Research Team

A Thesis submitted by

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Abstract

This thesis explores the gap in knowledge pertaining to the research problem of how and why a specific group of knowledge workers individually and collectively constructed their knowledge management (KM) capacity. The knowledge workers studied were situated within the context of an academic research team working in the (then) education faculty of an Australian regional university between 25 January 2011 and 1 December 2012.

The research problem led to the articulation of three research questions (RQs): (RQ1) *What was the KM capacity profile of the research team and its members?* (RQ2) *How did the research team members construct their KM capacity?* and (RQ3) *What was the relationship between the team's KM capacity and the team members' economic, cultural and social forms of capital?*

An interdisciplinary literature review in Chapter 2 resulted in the definition of KM capacity used within this study, wholistically framed by four dimensions: process, human, technology and context. Each of these KM dimensions was composed of various subdimensions. Based on that literature review, a conceptual framework was developed in Chapter 3, adapted from a model published by Van Winkelen and McKenzie (2011), and extended to incorporate economic, cultural and social forms of capital as identified by Bourdieu (1986), presented as a KM capacity-capital architecture.

The study's research design was qualitatively orientated, was situated in the social constructivist paradigm, and deployed an exploratory, ethnographic case study approach as explained in Chapter 4. The data collection and analysis techniques to address each RQ were detailed in Chapter 5.

The data analysis in response to RQ1 developed a qualitative KM capacity profile of each participant, describing *who* they were, as presented in Chapter 6. In response to RQ2, a thematic analysis of the semi-structured interview and focus group transcripts, and the ethnographic, observational evidence across all four of the KM capacity dimensions, detailed *how* the participants collaboratively co-constructed their KM capacity, as discussed in Chapter 7. For RQ3, Chapter 8 triangulated thematic analysis of all data sources to consider *why* the participants constructed their KM capacity in relation to forms of economic, cultural and social capital (Bourdieu, 1986).

The RQs1, 2 and 3 findings supported and refined wholistic comprehension of the *how and why* of contemporary KM capacity. The theoretical contributions arose from the synthesis and support of the KM capacity-capital architecture to reveal the relationship between the construction of the four KM capacity dimensions and the forms of economic, cultural and social capital within the context of a contemporary, academic research team. The methodological contributions were related to the triangulated analysis of multiple data sources and the visualisation of the findings. The practice-related contributions stem from the relevance of the KM capacity-capital architecture to understanding the *how and why* of KM worker dynamics.

Certification of Thesis

This thesis is entirely the work of Karl J. Matthews except where otherwise acknowledged. The work is original and has not previously been submitted for any other award, except where acknowledged.

Principal Supervisor: Professor Patrick A. Danaher

Associate Supervisor: Dr Catherine H. Arden

Associate Supervisor: Professor Raj Gururajan

Student and supervisors signatures of endorsement are held at the University.

Acknowledgements

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Keywords

Academic work, Bourdieu, capacity building, cultural capital, diversity, economic capital, education, ethnography, exploratory case study, interdisciplinary research, knowledge management, Myers Briggs Type Indicator (MBTI), qualitative research, regional university, research teams, social capital, social constructivism.

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This list is organised by publication type in order to reflect the variety of publications and their academic weight. The section headings are authored and edited reseach books, reportable chapters in edited research books, peer-reviewed research journal articles, peer-reviewed conference proceedings papers, and conference and seminar presentations. The publications and presentations itemised under each of these headings are listed chronologically by year of publication or presentation. Most of these publications are also cited elsewhere within this thesis, and thus also appear in the reference list.

Authored and Edited Research Books

2012

Danaher, P. A., De George-Walker, L. R., Henderson, R., **Matthews, K. J.**, Midgley, W., Noble, K., Tyler, M. A., & Arden, C. H. (Eds.) (2012). *Constructing capacities: Building capabilities through learning and engagement.* Newcastle upon Tyne, UK: Cambridge Scholars Publishing.

2014

Baguley, M., Danaher, P. A., Davies, A., De George-Walker, L. R., Jones, J. K., **Matthews, K. J.**, Midgley, W., & Arden, C. H. (2014). *Educational learning and development: Building and enhancing capacity.* Basingstoke, UK: Palgrave Macmillan/Palgrave Pivot.

Danaher, P. A., Davies, A., De George-Walker, L. R., Jones, J. K., **Matthews, K. J.**, Midgley, W., Arden, C. H., & Baguley, M. (2014). *Contemporary capacity-building in educational contexts.* Basingstoke, UK: Palgrave Macmillan/Palgrave Pivot.

Reportable Chapters in Edited Research Books

2012

Arden, C. H., Baguley, M., Danaher, P. A., Davies, A., De George-Walker, L. R., Fogarty, R. J., Henderson, R., Jones, J. K., **Matthews, K. J.**, McIlveen, P., McLennan, B., Midgley, W., Noble, K., Oliver, M. E., Peel, K., Turner, M., & Tyler, M. A. (2012). Analysing approaches to constructing capacities. In P. A. Danaher, L. R. De George-Walker, R. Henderson, K. J. Matthews, W. Midgley, K. Noble, M. A. Tyler, & C. H. Arden (Eds.), *Constructing capacities: Building capabilities through learning and engagement* (pp. 4-30). Newcastle upon Tyne, UK: Cambridge Scholars Publishing.

De George-Walker, L. R., **Matthews, K. J.**, & Danaher, P. A. (2012). Capacities, connections, capital and capabilities: Considering bioecological and electrical engineering perspectives. In P. A. Danaher, L. R. De George-Walker, R. Henderson, K. J. Matthews, W. Midgley, K. Noble, M. A. Tyler, & C. H. Arden (Eds.), *Constructing capacities: Building capabilities through learning and engagement* (pp. 31-50). Newcastle upon Tyne, UK: Cambridge Scholars Publishing.

Matthews, K. J. (2012). Constructing capacity through knowledge management practice: A research team case study. In P. A. Danaher, L. R. De George-Walker, R. Henderson, K. J. Matthews, W. Midgley, K. Noble, M. A. Tyler, & C. H. Arden (Eds.), *Constructing capacities: Building capabilities through learning and engagement* (pp. 200-217). Newcastle upon Tyne, UK: Cambridge Scholars Publishing.

Matthews, K. J. (2012). Constructing defence worker capacity with cyber capability: Learning from experience. In P. A. Danaher, L. R. De George-Walker, R. Henderson, K. J. Matthews, W. Midgley, K. Noble, M. A. Tyler, & C. H. Arden (Eds.), *Constructing capacities: Building capabilities through learning and engagement* (pp. 178-196). Newcastle upon Tyne, UK: Cambridge Scholars Publishing.

Tyler, M. A., Turner, M., Peel, K., Oliver, M. E., Noble, K., Midgley, W., McLennan, B., McIlveen, P., **Matthews, K. J.,** Jones, J. K., Henderson, R., Fogarty, R. J., De George-Walker, L. R., Davies, A., Danaher, P. A., Baguley, M., & Arden, C. H. (2012). Evaluating our research team's first three years to identify broader strategies for effective and sustainable capacity constructions. In P. A. Danaher, L. R. De George-Walker, R. Henderson, K. J. Matthews, W. Midgley, K. Noble, M. A. Tyler, & C. H. Arden (Eds.), *Constructing capacities: Building capabilities through learning and engagement* (pp. 256-275). Newcastle upon Tyne, UK: Cambridge Scholars Publishing.

2015

Matthews, K. J., & Danaher, P. A. (2015). Mainstreaming margins: Analysing the knowledge of an Australian university education research team. In K. Trimmer, A. L. Black, & S. Riddle (Eds.), *Mainstreams, margins and the spaces in-between: New possibilities for education research (Routledge research in education)* (pp. 50-65). Abingdon, UK: Routledge.

Peer-Reviewed Research Journal Articles

2011

Matthews, K. J., & Danaher, P. A. (2011). Academics wrestling with the dynamic impact of social connectivity to integrate emerging technologies into higher education curricula. *Studies in Learning, Evaluation, Innovation and Development*, *8*(1), 1-13.

Conference and Seminar Presentations

2010

Matthews, K. J. (2010, August). *A case study of influence on knowledge management practice*. Unpublished Doctor of Philosophy confirmation of candidature proposal. Faculty of Education, University of Southern Queensland, Toowoomba, Qld, Australia.

Matthews, K. J., & Cronan, D. (2010, September). *Libraries and knowledge management: An industry case study of Web 2.0 implementation*. Paper presented at the Australian Library Industry Association conference, Brisbane Convention & Exhibition Centre, Brisbane, Qld, Australia. Retreived from http://conferences.alia.org.au/access2010/pdf/Paper_Thu_1530_Karl_Matthews.pdf

Matthews, K. J. (2010, November 11). *Reimagining research teams for knowledge leadership*. Paper presented at the 6th University of Southern Queensland Postgraduate and Early Career Research Group research symposium, University of Southern Queensland, Toowoomba, Qld, Australia.

Matthews, K. J., Midgley, W., Cotta, D., & Danaher, P. A. (2010, November 11). *Reimagining research team purposes: Mechanisms for creating knowledge.* Paper

presented at the 6th University of Southern Queensland Faculty of Education Postgraduate and Early Career Researcher Group research symposium, University of Southern Queensland, Springfield, Qld, Australia.

2011

Matthews, K. J., Midgley, W., & Danaher, P. A. (2011, April 8). *Knowledge management for quality capacity building in research supervision: Doctoral student and supervisor perspectives at an Australian university.* Paper presented at the "Showcasing research supervision: Experiences, reflection, transformation" conference organised by Swinburne University, Melbourne Cricket Ground, Melbourne, Vic, Australia.

Temmerman, N., Turner, M., **Matthews, K. J.**, Hughes, S., Jones, J. K., & Danaher, P. A. (2011, May 19). *Listening to the voices that matter in our doctoral studies*. Panel presented at the 7th University of Southern Queensland Postgraduate and Early Career Researcher Group research symposium, University of Southern Queensland, Toowoomba, Qld, Australia.

Matthews, K. J. (2011, May 19). *The quest for research questions*. Paper presented at the 7th University of Southern Queensland Faculty of Education Postgraduate and Early Career Researcher Group research symposium, Faculty of Education, University of Southern Queensland, Toowoomba, Qld, Australia.

2012

Matthews, K. J. (2012, April 27). *Team dynamics: MBTI analysis.* Paper presented at the 9th University of Southern Queensland Postgraduate and Early Career Researcher

Group research symposium, University of Southern Queensland, Toowoomba, Qld, Australia.

Arden, C. H., Baguley, M., Danaher, P. A., Davies, A., De George-Walker, L. R., Fogarty, R., Henderson, R., Jones, J. K., **Matthews, K. J.**, McIlveen, P., McLennan, B., Midgley, W., Noble, K., Oliver, M. E., Peel, K., Turner, M., & Tyler, M. A. (2012, February 9). *Moving beyond sustaining synergies: A faculty research centre ponders its future(s).* Poster presented at the "USQ Community – Engaged Research" evening, University of Southern Queensland, Springfield, Qld, Australia.

2013

Matthews, K. J. (2013, November 29). *The knowledge map: Wordles.* Paper presented at the 12th University of Southern Queensland Postgraduate and Early Career Researcher Group research symposium, University of Southern Queensland, Toowoomba, Qld, Australia.

Matthews, K. J., & Danaher, P. A. (2013, July 2). *Chasing the faces in places and spaces: Exploring academics' MBTI preferences for knowledge management approaches and capacity-building strategies*. Paper presented at the annual conference of the Higher Education, Research and Development Society of Australasia, Auckland University of Technology, Auckland, New Zealand.

2014

Matthews, K. J. (2014, October 24). *Researching the production of knowledge: An analysis of knowledge management operations.* Paper presented at the 14th University of

Southern Queensland Postgraduate and Early Career Researcher Group research symposium, Springfield, Qld, Australia.

2015

Matthews, K. J. (2015, June 5). *Building researcher capacity via knowledge management*. Paper presented at the 15th University of Southern Queensland Postgraduate and Early Career Researcher Group research symposium, University of Southern Queensland, Toowoomba, Qld, Australia.

Matthews, K. J. (2015, October 2). *Academic knowledge, work and identity – pleasure, pain and permission.* Paper presented at the 16th University of Southern Queensland Postgraduate and Early Career Researcher Group research symposium, University of Southern Queensland, Toowoomba, Qld, Australia.

1. INTRODUCTION

1.1 Introduction

This introductory chapter provides an outline and a preview of the thesis structure and content. In this thesis, I explore the knowledge management (KM) capacity of knowledge workers in a research team within the (then) education faculty of an Australian regional university between 25 January 2011 and 1 December 2012. The purpose of the study was to understand how and why these participants individually and collectively managed their knowledge, and the relationship between their KM capacity and the forms of capital that they constructed.

1.2 The Structure of this Chapter

This chapter is presented in 10 sections. The next section (Section 1.3) provides additional background information to contextualise this study, leading into an outline of the research problem in Section 1.4. The three research questions (RQs) are then formulated in Section 1.5. An advance organiser is provided in Section 1.6 to orientate the reader to the research design, data collection and analysis process. This is followed by an explanation of myself as a biographically situated researcher (Section 1.7). The definitions of key terms are discussed (Section 1.8), and the overall thesis chapter structure is outlined (Section 1.9), followed by the chapter conclusion (Section 1.10).

1.3 The Background to the Research

The literature review in Chapter 2 provides a wholistic perspective on the KM topic, revealing that KM scholarship continues to evolve. A brief, introductory background on the KM topic is provided here, to contextualise the identification of the research problem and the formulation of the RQs.

KM and its relationship with various forms of capital have enabled the knowledge age revolution driving 21st century globalisation. Knowledge is commonly referred to as the human ability to use the information available effectively in specific contexts for solving specific problems (Davenport & Prusak, 2000). "Knowledge is a form of wealth and a pathway to prosperity" (Arup University, 2015, p. 28). The importance of KM is increasing globally owing to hyper-competition (Vaiappuri, Kamarulzaman, Vijayan, & Mukherjee, 2016). The increasingly fierce competition, the impact of globalisation and the rapid advance of technology have led to the emergence and development of a knowledge-based economy worldwide (Pearlson & Saunders, 2006; Rollo & Clarke, 2001). The evidence is clear that corporate KM programs have proliferated in recent years and that KM education is following suit (Bontis, 2002).

Despite this increasing importance of KM, its study is still relatively young (Hansen, Nohria, & Tierney, 1999). However, the concept of KM and the benefits of its practice appear to be well established (Turner & Minonne, 2010). Others highlight that "what still seems to be missing from the current understanding is how exactly engaging in KM contributes to business value creation" (Heisig et al., 2016, p.1169), "calling into question the raison d'être of the entire KM field" (Heisig et al., 2016, p.1170). That is, "further research on the relationship between KM and business outcomes is required" (Heisig et al.,

2016, p.1182). This identifies an important *how and why* research problem to explore, as is elaborated in the next section.

1.4 The Research Problem

The *how and why* problem pertaining to KM has been highlighted in the existing literature as being topical for KM practitioners around the world (Heisig et al., 2016). Substantial research efforts have explored aspects of KM in isolation (Davenport & Prusak, 2000; Nonaka & Toyama, 2003; Quinn, 2005; Sveiby, 2001; Van Winkelen & McKenzie, 2011). For example, a recent study of KM in academic teams focused only on knowledge sharing and social capital, and concluded that team structure and trust can have a positive influence (García-Sánchez, Díaz-Díaz, & De Saá-Pérez, 2017). Whilst a narrow focus has merit, I contend that a more wholistic view is needed to address the overarching *how and why* research problem discussed above. With that broader focus in mind, this study sought to explore this *how and why* relationship between KM and various forms of capital, and to address the overarching research problem of "*How and why do knowledge workers build their KM capacity?*" Thus, my research problem engages with this broader interdisciplinary debate around *how* KM capacity is constructed and *why* it is constructed.

In considering the "why" of KM capacity, the relationship with Bourdieu's (1986) forms of capital is explored and elucidated within the context of this study, culminating in the conceptual framework of the KM capacity-capital architecture as explained in Chapter 3, which is a theoretical contribution of this study. This research therefore extends understandings of the character and influence of the four dimensions of KM: the process, human, technology and context dimensions. Given the interest that Australian and international organisations have in exploring this KM research problem, it is considered

that this research provides theoretical, methodological and empirical contributions to the existing body of knowledge on this topic.

1.5 The Research Questions

In order to explore the gap in knowledge as identified in the literature review (Chapter 2) and structured around the conceptual framework (elaborated in Chapter 3), it was necessary to develop three RQs for the thesis:

RQ1: What was the KM capacity profile of the research team and its members? This RQ established a profile of each individual participating academic education research team member across the four KM dimensions, describing *who* they were and *what* individual characteristics were evident as they worked together to construct knowledge. The participants in this case study were all operating within the same context dimension, as academic staff members of a research team at an Australian regional university. Analysis of RQ1 was addressed in four sections to profile the team across the KM dimensions of process, human, technology and context, as is elaborated in Chapter 6.

RQ2: How did the research team members construct their KM capacity? This RQ ascertained *how* individual participants (individually and collectively) constructed their KM capacity in the university workplace, with reference to the four dimensions of KM, as defined in the literature review and the conceptual framework in Chapters 2 and 3 respectively. As with RQ1, RQ2 was also addressed in four sections to consider the context, human, technology and process dimensions of how the research team constructed their KM capacity through thematic analysis of descriptive data collected from semi-structured interviews, observations and surveys. RQ2 is elaborated in Chapter 7.

RQ3: What was the relationship between the team's KM capacity and the team members' economic, cultural and social forms of capital? This RQ addressed *why* participating team members individually and collectively constructed their KM capacity, by exploring the relationship between KM capacity construction and various forms of capital. The wording for RQ3 emerged from RQ1 and RQ2 findings, as is explained in Chapter 8. The data analysis built on the findings of the two previous RQs to reflect on how and why this KM capacity influenced the team, in light of the conceptual framework developed in Chapter 3. RQ3 is addressed in Chapter 8.

These three RQs are further contextualised and explained in the following chapters in order to explore and contribute to understanding and conceptualising KM capacity, and the evidence analysed from both individual and team perspectives addresses the RQs, problem and gap. In the interests of enhancing this thesis's clarity and readability, each of the four KM dimensions (process, human, technology and context) is addressed in the same sequence throughout this thesis to provide some consistent structural symmetry and alignment among the data analysis chapters. A "mind-map" diagram appears in Figure 1.1 to depict the basic linkage between the research problem and the RQs.

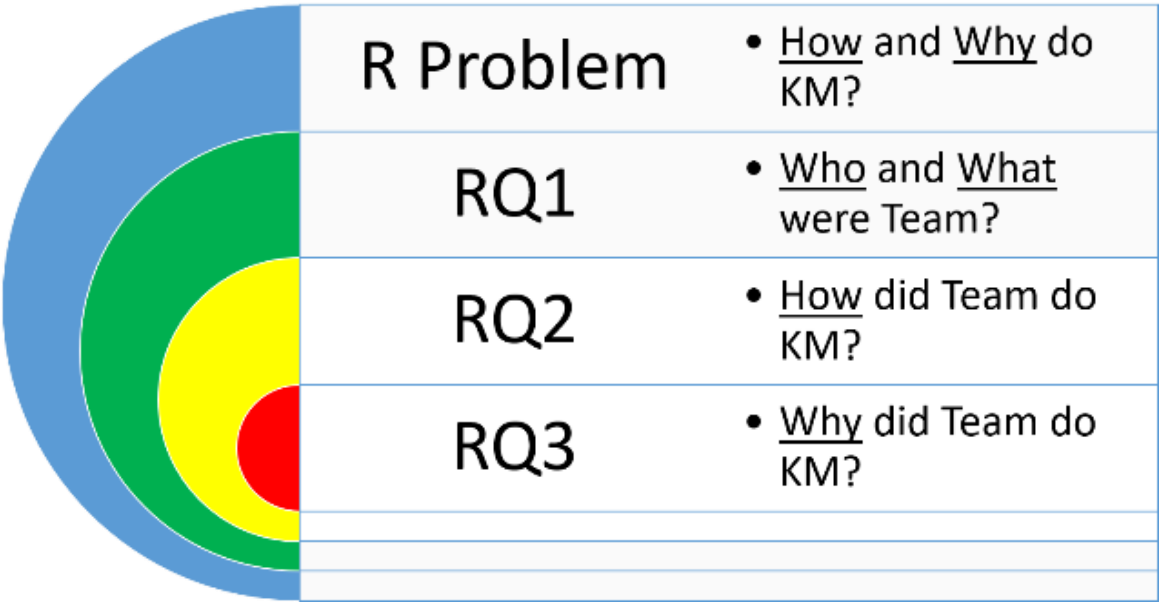

Figure 1.1 Mind-Map of the Research Problem-Questions Linkage

Figure 1.1 reveals how the RQs proceed to delve more deeply into understanding the team's KM relationships, and, like peeling back the layers of an onion, my research generates insights into how and why this team managed knowledge. This RQ linkage is elaborated in Table 1.1, which provides an overview of the RQs.

Table 1.1: Overview of the Study's RQs

	Process (KM Dimension)	**Human** (KM Dimension)	**Technology** (KM Dimension)	**Context** (KM Dimension)
RQ1 *What was the KM capacity profile of the research team and its members?*	What was the **process** dimension profile of the team?	What was the **human** dimension profile of the team?	What was the **technology** dimension profile of the team?	What was the **context** dimension profile of the team?
RQ2 *How did the research team members construct their KM capacity?*	How did the team **process** dimension construct KM capacity?	How did the team **human** dimension construct KM capacity?	How did the team **technology** dimension construct KM capacity?	How did the team **context** dimension construct KM capacity?
RQ3 *What was the relationship between the team's KM capacity and the team members' economic, cultural and social forms of capital?*	What was the relationship between the team's KM **process**, **human**, **technology and context** dimension and the team's economic, cultural and social **capital**?			

The RQs of this case study thus address the research gap identified in the literature. It is anticipated that my research findings will have application and relevance in relation to understanding KM, and they will also benefit individuals' professional development to improve their KM capacity, with potential implications for the university in this case study, as well as for other public and private sector organisations.

1.6 RQs-Data Collection-Data Analysis Linkage

The qualitative research design philosophy underpinning this research is discussed in Chapter 4, along with the case study approach deployed and the ethical aspects of the study. Each aspect of the RQs identified in Table 1.1 is analysed with respect to the data collected, with the specific details of the data collection and analysis process being explained in Chapter 5. The various data collection tools are deployed and these "data sources" are analysed thematically in Chapters 6, 7 and 8 to address RQs1, 2 and 3 respectively. Through this research design my study contributes to understanding the construction of KM capacity and its relationship with the selected forms of capital.

Given the complexity of this thesis, an advance organiser of the RQs-Data Collection-Data Analysis linkage structure is provided in Table 1.2, which presents a broad orientation to the contents of Chapters 6, 7 and 8. I acknowledge that this case study it is bounded in time and place to this particular Research Team in 2010-2012 and that the study was sufficiently detailed and comprehensive to obtain and analyse appropriate evidence to answer the RQs. This point is reiterated in Chapter 9. The details of Table 1.2 are elaborated in the subsequent thesis sections.

Table 1.2: Thesis Advance Organiser: RQs-Data Collection-Data Analysis Linkage

RQ	Data Collection and Analysis	Thesis Section
RQ1 *What was the KM profile of the research team and its members?*		Chapter 6
Process Dimension	• The CISUS activity profile, analysed from descriptive CISUS survey results, interview data and ethnographic observations. • The Wordle profile, analysed from the visualisation of publications and interview data.	Chapter 6.3
Human Dimension	• Team demographics profile, analysed from descriptive survey results and ethnographic observations. • Team MBTI profile, analysed from MBTI assessment data, interview data and ethnographic observations.	Chapter 6.4
Technology Dimension	• Technology profile, analysed from office photographs, interview data and ethnographic observations.	Chapter 6.5
Context Dimension	• Context profile, analysed from the Mandala analysis, interview data and ethnographic observations.	Chapter 6.6
RQ2 *How did the research team members (individually and collectively) construct their KM capacity?*		Chapter 7
Process Dimension	• Explores how the participants engaged with the CISUS processes to construct their KM capacity, based on interview data and ethnographic observations.	Chapter 7.3
Human Dimension	• Explores how the human dimension influenced the construction of KM capacity, based on Wordle analysis insights into knowledge specialisation being managed, MBTI interview data analysis related to participant KM capacity, MBTI interview data related to team KM capacity and MBTI interview data related to organisation KM capacity, all supported by interview data and ethnographic observations.	Chapter 7.4

Technology Dimension	• Explores the impact of technology on KM capacity, based on team ICT skill/use analysed from descriptive ICT survey data, interview data and ethnographic observations.	Chapter 7.5
Context Dimension	• Explores how the team context dimension influenced the construction of KM capacity, focussing on team maturity and culture based on analysis of Mandala interview data, team management documents, team KPIs, team KM outputs, interview data and ethnographic observations.	Chapter 7.6
RQ3 *What was the relationship between the team's KM capacity and the team members' economic, cultural and social forms of capital?*		Chapter 8
KM Capacity Objectives	• Analysis of the objectives and aims of the team KM capacity with respect to the KM capacity dimensions (process, human, technology and context) and the economic, cultural and social forms of capital generated. Explored under the emerging theme of "membership of the academy" data analysed, including team membership, funding, collaborative co-construction and team identity/brand. Analysis based on all available data, including interview and ethnographic observation data.	Chapter 8.3
KM Capacity Outputs	• Analysis of the team KM capacity outputs and products with respect to the KM capacity dimensions (process, human, technology and context) and the economic, cultural and social forms of capital generated. Explored under the emerging theme of "academic research outputs" analysis of participant publications and conference presentations informed findings. Analysis based on all available data, including interview and ethnographic observation data.	Chapter 8.4
KM Capacity Outcomes	• Analysis of the team KM capacity outcomes and results with respect to the KM capacity dimensions (process, human, technology and context) and the economic, cultural and social forms of capital generated. Explored under the theme of "academic career trajectory" analysis of participant qualifications, promotions, salary, offices and knowledge intangibility informed findings. Analysis based on all available data, including interview and ethnographic observation data.	Chapter 8.5

1.7 The Biographically Situated Researcher

This section states my researcher position, values and subjectivities, and so outlines my axiological assumptions. My personal position in adopting this topic for my academic research was a natural progression from my industry KM consultancy experiences. My academic interest in KM was stimulated by two main factors:

Firstly, over my years of consulting for managers and entrepreneurs I noticed a similar theme - they all appreciated that KM was important to their business interests, yet they found it confusing to understand and apply. Therefore, based on my academic interests I sought to explore KM with the ultimate goal of improving understanding of the topic, and assisting knowledge workers to apply KM more effectively in their respective contexts.

Secondly, publications by some academics (Drucker, 1998; Hammer, 2001; Kaplan & Norton, 2000; Porter, 2008) are often highly valued by industry practitioners. Indeed, leading management theories stem from published academic research rather than from industry practitioners. The academic approach to sharing one's professional insights appeals to me and so I sought to enhance my own academic skills though this PhD study located in the KM discipline, in order to contribute to KM development.

In terms of my academic training prior to this study, I pursued my Bachelor of Engineering (Electrical) degree after having already completed an Electrician Trade qualification, as I sought more theoretical insight to understand the physical sciences. Following that degree, I completed a Master of Business Administration degree whilst working as an electrical engineer, and I subsequently completed several other certificate courses related to quality management, project management and consulting. This led to a

management consulting role, and over the last 15 years I have specialised in the evolving discipline of KM.

This research effectively extends my 15 years of KM consulting experiences to the next professional level, which entails my greater engagement with academic discourse on the topic. My subjective assumptions about knowledge and the capacity for its management thus stem from my academic background in engineering and business, and from my consulting career conducting KM design, implementation and audits for various clients. My skills and experiences have influenced my philosophical assumptions as a biographically situated researcher within this PhD journey, and these assumptions are discussed in Section 4.3. My PhD journey has been an exploration of the various research options available to me, be they topic, methodologies or ways to publish and present findings.

Overall, my biographical experiences have brought a substantial set of diverse knowledge and skills to bear on this study, which have all hopefully added to the resulting depth of insight and to the contribution that this study makes. This research has progressed my biographical interests; however, my background influences and philosophical assumptions were carefully managed during this study, with the research analysis being based on careful, extensive and rigorous examination of the multiple sources of my research data collected during this study, as is discussed in Chapter 5.

1.8 Definitions of Terms and Format

For the reader's reference, key terms and abbreviations are defined when they first appear in the text, to assist in establishing the academic positions taken in this research study. These terms place boundaries around the research scope and the findings of this

research. The term "dimension" is used to explain the four main perspectives of the KM system. In my discussions, publications and presentations undertaken as part of this study, I tested and trialled various terms such as "domain", "facet", "component", "element" and "aspect" to describe these KM perspectives and concluded that the term "dimension" seemed to be most readily understood by audiences (Matthews, 2015a). Furthermore, any items existing within each dimension are termed "subdimensions".

I have also utilised the term "wholistic" to denote my interest in the whole, overall view of the KM topic. I acknowledge that using "wholistic' rather than "holistic" might annoy some readers, as might the use of other particular word spelling, such as "organisation" rather than "organization". However, I have adopted this spelling throughout as my preference within this thesis, as defined in Appendix A. For particular terms repeated throughout this thesis, such as KM, I have used an acronym to simplify the text for readability. For ease of reference, these terms are defined in an alphabetically ordered list (see Appendix A). In terms of format, this thesis follows the referencing standards of the American Psychological Association (APA) referencing system (American Psychological Association [APA], 2010).

1.9 The Structure of this Thesis

This thesis has been structured into nine chapters. In this first chapter, I have provided a brief overview of KM and I introduced the research problem. Chapter 1 has also acknowledged my biographical interests that have motivated this study from the perspective of my professional and research interests, and it has introduced the thesis scope, content structure and contribution.

Chapter 2 presents, reviews and critiques the substantial body of literature relevant to my thesis, addressing each of the four KM dimensions in turn. Chapter 2 proceeds to distil various subdimensions that exist within each of these four main dimensions. The end result of this Chapter 2 literature review is a wholistic perspective clarifying the four dimensions of KM, and the identification of the potential knowledge gaps that exist.

Next, in Chapter 3, the thesis presents the study's theoretical foundations through the development of a conceptual framework, whereby the output of the Chapter 2 literature review of KM (and of its process, human, technology and context dimensions) is integrated with Bourdieu's (1986) three forms of capital (economic, cultural and social) to develop the KM capacity-capital architecture. This KM capacity-capital architecture provides the conceptual framework for this study, enabling a systematic approach to explore the research problem and its associated three RQs.

In Chapter 4 I elaborate this study's research design, based on my study's conceptual framework, and I outline and justify the research approach and method adopted for this research study to elicit how the research team managed knowledge and the relationship with the various forms of capital. The implications of the research philosophy and paradigm are also presented. In addition, the ethical and political aspects of the study are addressed in this chapter.

Chapter 5 details the data collection and analysis techniques deployed. Nine participants were ethnographically observed throughout the data collection period, and these observations were triangulated with other data sources such as a series of semi-structured interviews, focus groups and descriptive surveys. The data were analysed thematically to address the three RQs, highlighting the academic rigour underpinning this study.

Chapters 6, 7, and 8 analyse the data collected during the research process, with a separate chapter dedicated to each of the three RQs. Chapter 6 explores RQ1 by deploying techniques to deliver a KM profile for each participant. To achieve this KM profile, descriptive, qualitative data about selected subdimensions of each of the four KM dimensions were analysed. For example, the human dimension profile of the team was gleaned through analysing each participant's MBTI preference. Selected subdimensions of each KM dimension were considered that, when combined with ethnographic observations of the team in operation, enabled a rigorous, evidence-based KM profile to be constructed, for each participant in the team for comparing and contrasting. The outcome of this RQ1 profiling analysis revealed the diversity among the individual team members and provided a foundation for exploring the team KM capacity in relation to RQ2.

Chapter 7 explores RQ2, analysing how the team constructed their KM capacity. This chapter draws on the participant profiles developed during the Chapter 6 data analysis to analyse team data about each of the four dimensions of KM. Each dimension was explored through interviews as well as from ethnographic observations and focus group discussions, in order to establish how the team constructed their KM capacity. Quotations from the semi-structured interviews and observations support and reinforce these research findings. Particular attention is given to the interactions among the participants and the consequences that these interactions had for constructing their KM capacity.

Chapter 8 explores RQ3, analysing the relationship between the team's KM capacity and Bourdieu's (1986) forms of economic, cultural and social capital, informed by the theoretical KM capacity-capital architecture gleaned from Chapter 3. Three themes emerged from the data, based around the KM capacity objectives, outputs and outcomes, and enabled further insight into the relationship between KM capacity and forms of capital.

In the final chapter, Chapter 9, the RQ findings are summarised, based on the data analysis in Chapters 6, 7 and 8, along with a conclusion to the overall research problem. Chapter 9 also identifies the contributions to theoretical, methodological and practice-related knowledge arising from this research study. This thesis concludes that there is a clear, yet complex, relationship between KM capacity and the selected forms of capital.

1.10 Conclusion

This chapter has laid the foundation for this thesis, providing the background to the research, introducing the research problem and the RQs, and outlining the research design, data collection and data analysis method. An explanation of my biographical research situation has been provided, followed by reference to definitions of key terms. Finally, the thesis chapter structure was presented in order to assist the reader to navigate the subsequent chapters. Chapter 2 provides a discussion of the extant literature.

2. THE LITERATURE REVIEW

2.1 Introduction

Chapter 1 introduced this thesis and gave a broad overview of the content of each chapter. This chapter reviews the extant interdisciplinary literature related to KM to identify the main issues surrounding the research problem, in order to situate the study within the context of the broader body of previous and current research and to identify knowledge gaps. This literature review is intended to synthesise and integrate a cross-section of the KM material available that addresses the various topics, individually and in combination, to support the conclusion that consideration of four KM dimensions is necessary in order to obtain a wholistic view of the KM topic.

The KM literature is vast, and I approached it wholistically by considering four overarching dimensions; the process, human, technology and context dimensions. This four dimensional approach enabled systematic review of the various multi-disciplinary approaches to KM, and resulted in a novel conceptualisation of KM capacity. In doing so, a gap in the existing knowledge is identified, regarding the wholistic comprehension of contemporary theoretical understandings of KM capacity, and the interrelationship among the process, human, technology and context dimensions. Thus, the literature review and synthesis was helpful to justify the distillation and development of this four dimensional model to address the gaps in KM conceptualisation.

I acknowledge at the outset the difficulty of synthesising the multidisciplinary literature, based on my foundational comprehension of the broad scholarship and practice that underpin 'other' disciplines. However, this literature review serves to inform the

development of Chapter 3's conceptual framework that guides this research within the context of a university research team.

2.2 The Structure of this Chapter

This chapter is divided into 10 sections. The first two sections provide an introduction to and an overview of the structure of the chapter. Further background information about the history of KM theory is presented to support the significance of KM scholarship as a contemporary research topic (Section 2.3). Sections 2.4 to 2.6 detail the literature pertaining to the KM process, human and technology dimensions respectively. In Section 2.7, I provide the rationale for my research taking a wholistic view of KM and contemplating all four theoretical KM dimensions of process, human, technology and context. In Section 2.8, I address literature relevant to my study context dimension. Section 2.9 proceeds to identify the gap in the literature on which this study focuses, whilst Section 2.10 concludes the chapter.

To assist the reader to navigate the complexity of the four KM dimensions addressed in this chapter, Figure 2.1 provides a "helicopter view" advance organiser. This diagram summarises how the threads of literature relating to each KM dimension are woven together to contemplate the interactions and intersections among the four KM dimensions to create the comprehensive KM view that is explored in this chapter.

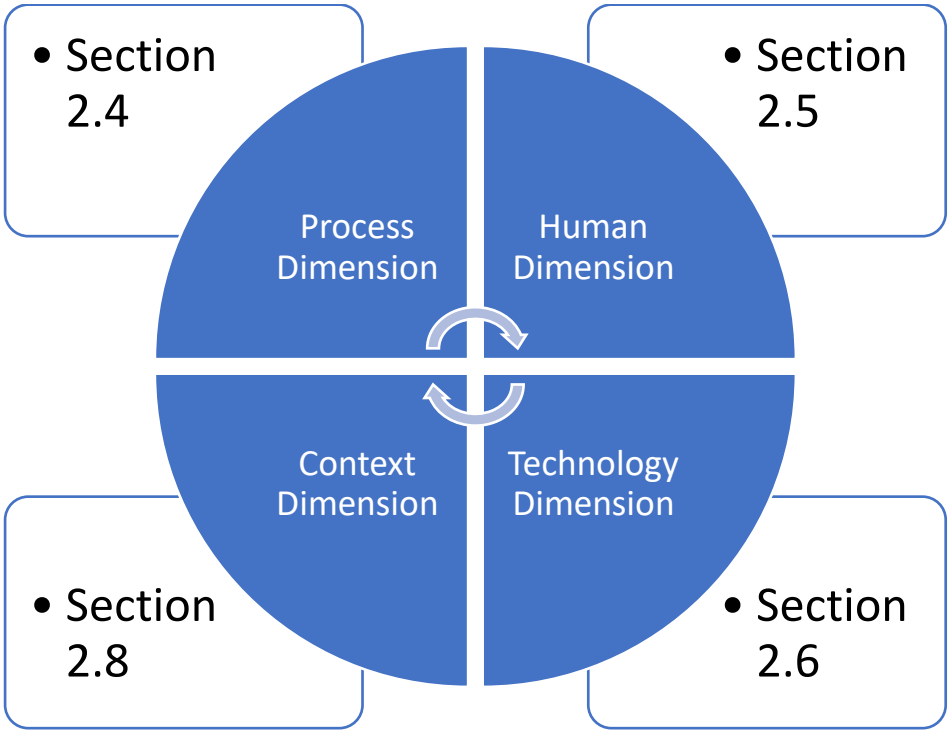

Figure 2.1 Advance Organiser of the Four KM Dimensions Discussed in Chapter 2

2.3 KM Background

The concept of, and the literature relating to, managing human knowledge have been developed over thousands of years by many diverse scholars and philosophers. Knowledge can be defined in multiple ways. One definition of knowledge is information that is "known" from previous training and stored in a person's mind to be readily accessible (Brodie & Brodie, 2009, p. 143). As was mentioned in Chapter 1, knowledge is commonly referred to as the human ability to use the information available effectively in specific contexts for solving specific problems (Damm & Schindler, 2002; Davenport & Prusak, 2000; Wijetunge, 2002). Knowledge provides a higher level of meaning about data and information (Turban, Aronson, & Ting-Peng, 2005). A cross-section of that historical literature is cited below, selected for its relevance to the contemporary KM topic that this study explores.

KM has been a human challenge for thousands of years. As a result, "KM is a very wide, multi-disciplinary and heterogeneous field" (Heisig et al., 2016, p.1183). Methods to conceptualise knowledge have been discussed throughout history, with the Greek, Roman, Egyptian, Mayan, Chinese and Indian empires being recognised as having made significant contributions. For example, the benefits of KM were realised by the Chinese military strategist Sun Tzu (c. 544–496 BCE), who has had the following proverb in *The Art of War* treatise attributed to him: "If you know both yourself and your enemy, you can win numerous battles without jeopardy" (Tzu & Giles, 2012, p. 63). Other KM advances were developed by the ancient Greek thinkers such as Socrates (469 – 399 BCE), Plato (c. 427-347 BCE) and Aristotle (384-322 BCE), who founded many intellectual traditions and philosophies in both the physical and the social sciences that remain relevant today (Blackson, 2011).

Over the last two generations, we have moved from the Industrial Age (of Manpower) into the Information Age (of Mindpower), in which knowledge is now a primary resource and the most valuable factor of production (Tracy, 2004) - an age where one is rewarded for the quality and quantity of results, accomplishments and outcomes rather than for activities and inputs (Tracy, 2004). The world has moved from a production-based economy to a knowledge-based one (Powell & Snellman, 2004). In the knowledge economy, knowledge becomes a meaningful resource (Drucker, 1993; Nonaka & Takeuchi, 1995). "KM has been approached from various angles, such as organisational theory, epistemology, cognitive science, management strategy, anthropology and computer science, to name a few" (Chae & Bloodgood, 2006, p. 3).

Despite these historical roots, the term "knowledge management" is relatively recent, and its research base is still under development (Bouthillier & Shearer, 2002). It has been

argued that the main academic research roots of KM occurred during the mid-1970s (Gu, 2004). The expression "knowledge management" was apparently coined by Karl Wiig at the 1986 International Labour Organisation (ILO) conference held in Switzerland (Beckman, 1999; Wiig, 1999), yet it took another decade for KM discourse to become clearer (Jashapara, 2005). Despite the relevance of KM to firms, it was only in the 1990s that greater interest emerged to leverage relevant knowledge strategically for the organisation (Teece, 2000).

Whilst "KM as a conscious practice is still young" (Hansen et al., 1999, p. 1), KM has already been considered a business salvation (Martensson, 2000). During the past decades, KM has emerged as a key discipline that explains organisational learning and innovation (Soto-Acosta, Colomo-Palacios, & Popa, 2014). Over the past 20 years, there has been a growing recognition of the role of knowledge in organisations (Lie, 2008). Consequently, contemporary KM is about harnessing the intellectual and social output of individuals in order to improve organisational learning capabilities and innovative potential (Castells, 2010).

Those individuals whose work is to manage knowledge are now often called "knowledge workers", describing individuals who think for a living (Davenport, 2005). According to Davenport (2005), the first person to describe knowledge workers to any substantial degree was Peter Drucker in 1959 (Davenport, 2005; Drucker, 1959). Drucker mused that making knowledge work productive would be the great management task of the 20th century (Drucker, 1969), and he predicted the rise of a knowledge society, with knowledge being its key resource, and with knowledge workers being the dominant group in its workforce (Drucker, 2001).

Despite this recognised importance of knowledge workers to the economic success of countries, companies and other groups, we still know little about how to improve knowledge workers' performance (Davenport, 2005). Indeed, some commentators are quite cynical about the relatively recent development of the term "KM", with some considering it nothing more than a fad, or a trendy variation on management (Wilson, 2002). It has even been suggested that KM could become outdated in the 21st century (Wiig, 1997). Yet, contrary to some cynical views, KM appears still to be relevant and important in contemporary contexts. The interest in KM has warranted the organisational position of chief knowledge officer (CKO) (Bontis, 2002). The CKO is responsible for ensuring that the organisation maximises the value that it achieves through knowledge, and is responsible also for managing the intellectual capital and KM practices in an organisation (Bontis, 2002; Liebowitz, 2002). In 2002, 25 per cent of Fortune 500 companies had CKOs (Bontis, 2002). Many universities have also employed KM-related staff members to assist with the human, technology or process dimensions of the institution.

This brief background reveals that the field of KM is continuing to develop. Given the breadth and depth of developments, even experts may not be fully cognisant of all the existing KM research evidence available (Heisig et al., 2016). Although many organisations manage knowledge, KM success factors remain minimally researched (Lehner & Haas, 2010). Despite many years of KM research much of it has not permeated practitioner contexts, and typically KM remains at the individual level rather than at the team level (Standing, Standing, Gururajan, Fulford, & Gengatharen, 2016).

KM requires further research. Whilst awareness of the KM construct accelerated in the 1960s, there remains little overall advance in the construct itself, despite widespread recognition that KM contributes to organisational success (Oliver, 2003). Thus, it is

generally recognised that the KM field requires further research (Chae & Bloodgood, 2006; Gu, 2004; Hazlett, McAdam, & Gallagher, 2005; Jasimuddin, 2012; Moffett, McAdam, & Parkinson, 2003; Raub & Rüling, 2001). A rigorous approach to progressing KM development is now encouraged, in pursuit of the idea that knowledge is a key to performance and, as such, that knowledge production and integration in the organisation deserve the same attention that we provide to the production of other vital assets (Firestone, 2001).

The above review of the KM background literature leads to the conclusion that KM is an enduring human and organisational concern, with knowledge workers increasingly being employed in contemporary positions. Thus, scholarship related to KM remains a relevant research topic, and further study is required to contribute to this developing body of knowledge. I now proceed to analyse critically the significant body of scholarly KM literature in order to identify the particular gaps in knowledge that my study addresses. The KM literature is addressed by dividing it into four dimensions - the process, human, technology and context dimensions - each of which is explained in the following sections.

2.4 The KM Process Dimension

The first dimension to be considered is the process dimension. There is a substantial body of KM literature detailing a variety of existing models to describe the KM process dimension. This section provides an introduction to various KM process models, to compare and contrast critically these various views about the KM process dimension. I then proceed to synthesise themes from this process dimension literature to develop my own KM process model (CISUS model) as the tool for analysis of my study data related to the KM process dimension.

2.4.1 Overview of the Process Dimension

The process dimension of KM capacity contains many perspectives, each adding something to assist comprehension. However, with so many competing, and sometime even conflicting perspectives, it is challenging to confidently select a model on which to structure my study analysis. This subsection of the chapter considers a selection of existing process dimension models, to reveal the common create, improve, store, use and share process themes evident in many of the models, leading to development of my own CISUS model.

2.4.2 Overview of the KM Process to Create Knowledge

The process to create knowledge is the subject of much discussion within the literature. As KM increases in importance, it is necessary to pay increased attention to the process dimension (Nonaka, 1994). Understanding the process of knowledge creation helps to make KM more efficient and effective (Vaiappuri et al., 2016). Even if organisations could provide access to substantial quantities of knowledge, it is the creative process that achieves the ultimate breakthroughs (O'Leary, 1998). Revolutionary explosions of newly created knowledge can make the old knowledge obsolete (Kuhn, 1962).

Knowledge can be classified into two categories, tacit and explicit, whereby explicit knowledge is codified (documented) and so can be communicated, both systematically and formally, whereas tacit knowledge exists only within an individual's head and can be shared only tacitly (Alavi & Leidner, 2001). In 1995, it was proposed that the process of organisational knowledge creation was through the interaction of tacit and explicit knowledge involving a process spiral of socialisation – externalisation – combination – internalisation (SECI), with each circuit of the spiral building towards knowledge accumulation (Nonaka & Takeuchi, 1995). Whilst this SECI process has been critiqued

(Gourlay, 2006), it is still highly cited and respected as a knowledge creation process (Easterby-Smith & Lyles, 2003) and as an "influential model in knowledge strategy literature" (Choo & Bontis, 2002, p. ix). The SECI spiral continues to be relevant to KM theory (Nonaka & Toyama, 2003).

Furthermore, studies into different approaches to the KM creation process have identified a codification strategy or a personalisation strategy. Codification uses explicit information sources to encourage the creation of new knowledge or "know-how", whilst personalisation encourages people to connect with one another and to transfer more complex, tacit knowledge or "know-what" (Alavi & Leidner, 2001; Grant, 1996; Hansen et al., 1999; Wright, 2005).

2.4.3 Overview of the KM Process to Improve Knowledge

Other models in the literature recognise the process to improve knowledge to be a vital aspect of KM. The continuous improvement philosophy, or "kaizen" in Japanese, aims to refine KM processes so that there are no errors or defects in the output (Deming, 1982). This KM process philosophy transformed the post-World War 2 industry of Japan, and subsequently it was adopted by Western organisations as "quality management" (Standards Australia, 1994, 2005b). From the mid-1980s, a consortium that included the technology company Motorola added a measurement aspect to quality management, in an effort to reduce their product failures and thus to improve their competitiveness (Tennant, 2001). Ultimately termed "6 Sigma", it utilised the processes of Define, Measure, Analyse, Improve and Control (DMAIC). Various similar continuous improvement philosophies now exist, such as Plan, Do, Check, Act (Deming, 1986; Shewhart, 1939), Approach, Deploy, Results, Improve (Australian Universities Quality Agency [AUQA], 2007) and the

Observe, Orientate, Decision, Action (OODA) loop (Boyd, 1976), all of which remain relevant to KM applications.

2.4.4 Overview of the KM Process to Store Knowledge

The KM process to store knowledge is a specific focus of much scholarly literature. The effective storage of knowledge is a critical KM process. In the post-industrial 21st century, information is abundant and intensive, requiring individuals to possess information literacy to store and manage the proliferation of information resources and the varied methods of access (Australian and New Zealand Institute for Information Literacy [ANZIIL], 2004). A KM process called the "five hat racks" suggests organising knowledge storage by either category, time, location, alphabet or continuum (Lidwell, Holden, & Butler, 2010). The "RGBY" mindset and quality review model ® has also proven useful in storing critical organisational knowledge in colour coded ways so as to enhance human comprehension (Wilson, 2017). The key to effective KM may be more strongly influenced by the capture, organisation and dissemination of knowledge than by its creation (Davenport, 1997). Along these lines, there is the cynical saying that "the two main KM storage tools are the delete button and waste paper bin" (anon.), implying that part of the storage process is the purging and destruction of knowledge. Understanding how to prioritise and cull knowledge is a key capability of effective knowledge managers in the digital era (Arden, 2016).

2.4.5 Overview of All KM Processes, Including to Use and Share Knowledge

The KM processes to create, improve and store knowledge have been considered in the preceding subsections. The inclusion of the processes to use and share knowledge are also vital to the construction of overall KM capacity. Various KM process models existing

in the literature have strived to document and define the overall KM processes, including the use and share processes, and some examples are discussed in this subsection.

KM has been defined as the management of knowledge processes for creating, organising, transferring and sharing knowledge throughout the organisation (Berdrow & Lane, 2003; Davenport & Prusak, 2000; Lee & Kwok, 2000; Wijetunge, 2002). Also KM has been considered the systematic process of managing knowledge to facilitate the creation, organisation, sharing and utilisation of organisational knowledge to achieve the strategic aims of an organisation (Detienne & Jackson, 2001).

In the contemporary environment, the timely creation and collection of information and knowledge, the adequate storage and maintenance of information and knowledge, and the efficient diffusion and effective use of information and knowledge are of the utmost importance to the sustainability, even the survival, of modern organisations (Drucker, 1997). It has been claimed that the process of managing human knowledge has become a critical skill for organisational survival (Choo, 1998). Indeed, KM experts have asserted that the process of knowledge sharing positively affects organisational performance and the quality of decisions made in organisations (Heisig et al., 2016).

KM has also been defined as a set of process actions that allow an organisation to utilise knowledge (Davenport & Prusak, 2000), and involves processes to acquire, measure, teach, share and apply knowledge (Smith, 2001). Another KM process model begins with knowledge creation and progresses to knowledge capture and storage, knowledge refinement, knowledge distribution, knowledge use and monitoring of the entire process, which should then impact on the beginning of the process (Davenport & Völpel, 2001).

Other views suggested that KM consists of the creation, capture, organisation, search, retrieval, communication and visualisation of knowledge (Coleman, 1999; Ginsburg & Kambil, 1999), and that KM requires one to codify, collect, organise and then disseminate knowledge (Alavi & Leidner, 2001). KM involves knowledge creation, followed by knowledge interpretation, knowledge dissemination and use, and then knowledge retention and refinement (De Jarnett, 1996). The American Productivity and Quality Center (APQC) (1996) defined KM as the strategies and processes of identifying, capturing and leveraging knowledge to enhance competitiveness. The KM process is concerned with capturing an organisation's know-how and know-what through creation, collection, storage, distribution and application (Miller, 1999).

One popular KM process model was the create, store, use, reuse and dispose cycle (Sveiby, 1997, 2001). However, I consider the reuse and dispose processes to be subsets of the use and store processes respectively, and there is no consideration of the improve and share processes. Another view is that KM is focused on identifying, capturing and applying assets (Zack, 1999). KM has also been defined as the processes of discovery and capture of knowledge, the filtering and arrangement of this knowledge, and the value derived from sharing and using this knowledge throughout the organisation (Bernbom, 2001).

The Australian Standard in KM determined that the KM process consists of four activities: creating, discovering and acquiring knowledge; capturing and storing knowledge; presenting, distributing and sharing knowledge; and revising and disposing of knowledge (Standards Australia, 2005a clause 1.4.1). Notably, the Australian Standard on record keeping details a similar process namely, capture, registration, classification, storage, access, use and disposal (Standards Australia, 2004 clause 4.3.1). Both of these Australian standards have legal application to the Australian university that is the subject

of this study context. I agree with the intent of these Australian standards; however, again I argue that the model can be refined as elaborated below.

There is empirical and scholarly evidence that knowledge creation, sharing and retention are dynamically interrelated, and a model showing this KM relationship has been developed (Singh & Gupta, 2014), as is shown in Figure 2.2.

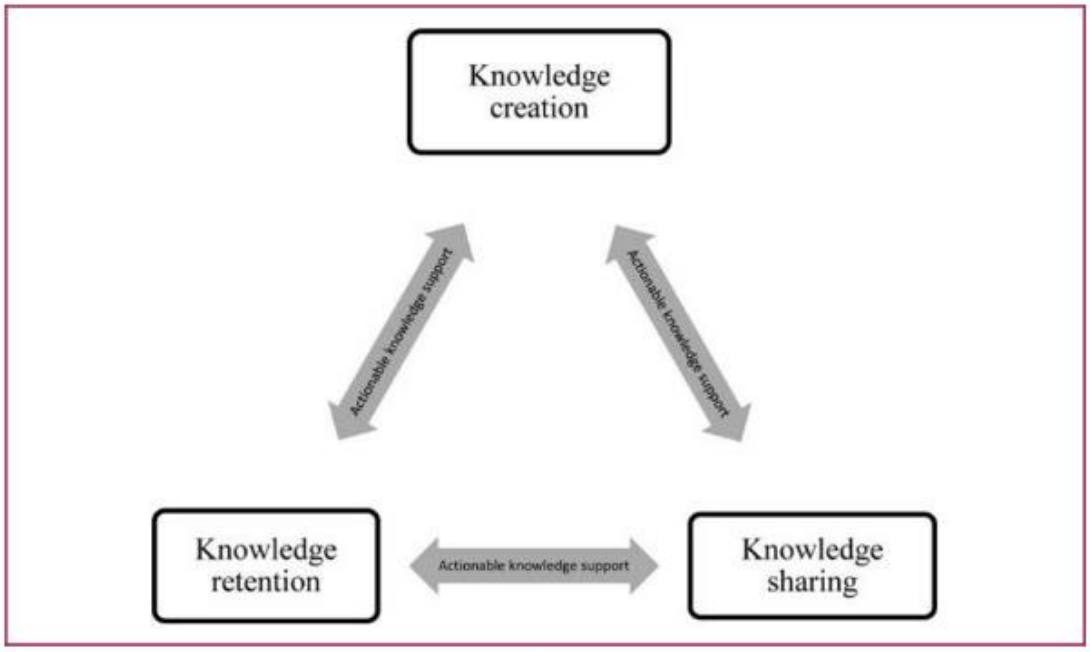

Figure 2.2 The Four-Factor Model of KM (Singh & Gupta, 2014, p.789)

I have highlighted this four-factor model (Singh & Gupta, 2014) for three reasons. Firstly, this model reveals the dynamic interrelationship among the create-store-share processes within the KM process dimension. Secondly, whilst I quite like this four-factor model, it does not explain the KM process dimension to my satisfaction as the *use* of knowledge is not shown. And thirdly, it shows that, even in 2014, KM process theory was still being debated, supporting my claim that a research knowledge gap existed in 2010 when I first developed my model of the KM processes. Overall, the literature reviewed

above reveal agreeance that there are processes required to enable KM capacity and performance; however, at the commencement of this study there existed no internationally accepted and applied standard model of these KM processes.

2.4.6 A Taxonomy of the KM Process Literature

The previous subsection provided a selection of the literature that revealed the fractured state of KM process comprehension. As a result of this finding, I developed a chronological taxonomy to analyse thematically and to synthesise selected KM process dimension literature, as is shown in Table 2.1. This taxonomy analyses the process dimension literature in a similar way to Girard and Girard (2015), whose work was found some years after Table 2.1 was constructed, and validated my 2010-era work.

Table 2.1: A Summary of the KM Process Dimension Literature

KM Create Process	**KM Improve Process**	**KM Store Process**	**KM Use Process**	**KM Share Process**	**Author/s (date)**
Check	Act	Plan	Do		(Shewhart, 1939)
Tacit	-	Explicit	-	-	(Polanyi, 1958, 1967)
Observe	Orientate	-	Decide, Act	-	(Boyd, 1976)
Check	Change	Plan	Do	-	(Deming, 1986)
Create	Justify	-	Level	Share	(Nonaka & Takeuchi, 1995)
Internalisation	Externalisation	-	Combination	Socialisation	(Nonaka & Takeuchi, 1995)
Create	Interpret, Refine	Retain	Use	Disseminate	(De Jarnett, 1996)
Identify	-	Capture	Leverage	-	(American Productivity & Quality Centre [APQC], 1996)
Creation	-	Capture, Organisation	-	Dissemination	(Davenport, 1997)
Construct	-	Embody	Use	Disseminate	(Demerest, 1997)
Acquire	Solve	Store	Own	Disseminate	(Jordan & Jones, 1997)
Create	-	-	Apply	-	(Boisot, 1998)

Creation	Capture	Organisation, Search, Retrieval	Visualisation	Communication	(Ginsburg & Kambil, 1999), (Coleman, 1999)
Create	Map, Evolve	Store, Bundle	Reuse	Share, Transfer	(Despres & Chauvel, 1999)
Create	-	Collect/Store	Apply	Distribute	(Miller, 1999)
Identify	-	Capture	Apply	-	(Zack, 1999)
Capture	Formalise	Organise	Apply	Distribute	(Nissen, Kamel, & Sengupta, 2000)
Generate	-	Codify	-	Transfer	(Davenport & Prusak, 2000)
Acquire	Measure	-	Apply	Teach/Share	(Smith, 2001)
Create	-	Organise	Use	Share	(Detienne & Jackson, 2001)
Measure	Analyse, Improve	Define	Control	-	6 Sigma (Tennant, 2001)
Create	Dispose	Store	Use/Reuse	-	(Sveiby, 1997, 2001)
Create	Refine	Capture/Store	Use/Monitor	Distribute	(Davenport & Völpel, 2001)
Codify	-	Collect	Organise	Disseminate	(Alavi & Leidner, 2001)
Discovery	Filter	Capture	Use	Share	(Bernbom, 2001)
Produce	-	-	Integrate	-	(McElroy, 2002)
Identify	-	Capture	Apply	-	(Jennex & Olfman, 2002)
Generate	-	-	Integrate	Share	(Fong, 2003)

-	-	-	-	Share	Cooper, 2003)
Create, Discover, Acquire	Revise, Dispose	Capture, Store	-	Present, Distribute, Share	Australian Standard of KM (Standards Australia, 2005a clause 1.4.1)
Create	-	Organise	Transfer	Share	(Berdrow & Lane, 2003; Davenport & Prusak, 2000; Lee & Kwok, 2000; Wijetunge, 2002)
Creation	Refinement	Administration	Utilisation	Dissemination	(Kasvi, Vartiainen, & Hailikari, 2003)
-	Disposal (if improved knowledge is available)	Capture, Registration, Classification	Access/Use	-	Australian Standard on Record Keeping (Standards Australia, 2004 clause 4.3.1)
Create		Store/Retrieve	Apply	Transfer	(Kankanhalli & Tan, 2005)
Creation, Identification, Acquisition	Refinement	Codification, Storage	Application	Dissemination	(Wang, 2005)
Create	-	Store	-	Transfer	(Wang, Ashleigh, & Meyer, 2006)
-	Improve	Approach	Deploy	Result	(Australian Universities Quality Agency [AUQA], 2007)
-	-	Category	-	-	(Lidwell, Holden, & Butler, 2010)
Create	-	Store	-	Transfer	(Rodriguez & Edwards, 2010)

Create	-	Measure	-	Disseminate	(Turner & Minonne, 2010), (Sveiby & Risling, 1986), (Huber, 1991), (Edvinsson & Malone, 1997), (Sveiby, 1997), (Argote, 1999)
Create	-	-	Utilise	Disseminate	(Jayasingam et al., 2012)
Creation	Acquisition	-	KM 2.0	Sharing	(Sigala & Chalkiti, 2014)
Creation	Acquisition	-	Utilisation	Dissemination	(Soto-Acosta et al., 2014, 2015)
Creation	-	Retention	Support	Sharing	(Singh & Gupta, 2014)
Acquisition	-	-	Development	Dissemination	(Longo-Somoza, Bueno, & Acosta-Prado, 2015)
Create	-	Manage	Use	Share	(Girard & Girard, 2015)

2.4.7 My "CISUS" Model of the KM Process Dimension

The KM process dimension literature taxonomy in Table 2.1 shows that scholars and KM process models have used different terminologies over the past 20 years, and there is no single, accepted, popular, standard model to depict the KM process dimension. This result supported Oliver's (2003) observation that further KM convergence is required. This finding was problematic for establishing the KM process dimension theory to support my study, as, whilst my preference was to adopt an existing process model from the academic literature, I was vexed by there being no outstanding model that satisfied my biographically framed comprehension of the topic.

Analysing Table 2.1 further, some process themes appeared consistently within the existing models, converging around five KM processes: create, improve, store, use and share. However, from the over 40 examples analysed in Table 2.1, only six models incorporated all five KM processes (Bernbom, 2001; Davenport & Völpel, 2001; Despres & Chauvel, 1999; Kasvi, Vartiainen, & Hailikari, 2003; Nissen, Kamel, & Sengupta, 2000; Wang, 2005). Frustratingly, those six examples all used different, and often unnecessarily complex, terms for each KM process. I was also disappointed that even the Australian Standard of KM (Standards Australia, 2005, clause 1.4.1) failed to address all five processes, neglecting the "use" of knowledge.

Faced with this lack of a KM standard to explain adequately the KM process dimension to my satisfaction, I designed my own model (see Figure 2.3) to use in this research during my PhD candidature proposal development. My design principle was that KM is difficult enough for knowledge workers to comprehend without further complicating it with complex terminology that discriminates against non-English speakers. For example,

a simpler synonym of the multi-syllable terms "dissemination" and "socialisation" is "share". Similarly, the simple synonym of "utilisation" and "application" is "use". Thus, wielding Occam's razor I sought to synthesise the common KM process themes into clear, concise terms.

Therefore, the terms "create", "improve", "use", "store" and "share" (CISUS) were selected to depict the five core KM processes along with the relationship that exists among these processes. I refer to my KM process dimension model presented in Figure 2.3 as the "CISUS model", and it was originally developed for and presented to my confirmation of PhD candidature proposal panel (Matthews, 2010a).

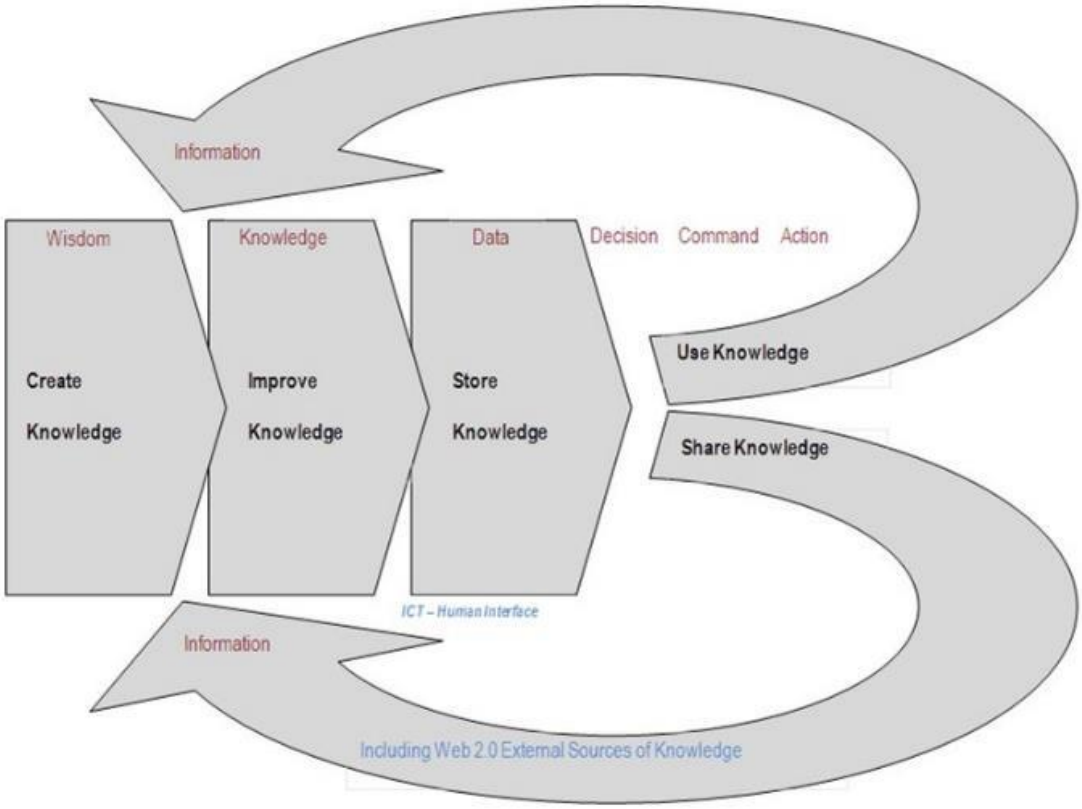

Figure 2.3 The CISUS Model (Matthews, 2010a)

This CISUS model also shows how the KM processes connect and combine to enable decisions, commands and actions. My CISUS model was thus used in this study to explore the KM process dimension and is discussed further below, and in Chapter 3.

The CISUS model has since been utilised in various publications during my PhD candidature, and it has been presented at various Australian conferences. For example, the CISUS model provided the framework in an industry case study application for a structured conceptualisation and discussion of KM implementation (Matthews & Cronan, 2010), for contemplating knowledge leadership (Matthews, 2010), for providing a contemporary structure contextualising KM for capacity building (Matthews, Midgley, & Danaher, 2011), and subsequently for structuring the analysis of my study findings for constructing capacity through KM practice (Matthews, 2012a) and to inform my views on wholistic KM (Matthews, 2015b). All of these publications were the result of my ongoing interest in obtaining peer review feedback about the CISUS model during the course of this study, with the main result being positive feedback. I contend that my CISUS model of the KM process dimension incorporates and extends the previous literature, and thus provides the theoretical foundation for my study's RQ analysis.

2.4.8 Conclusion to the Process Dimension

The process dimension of KM has been developed and debated within a substantial body of the literature, as was shown in Table 2.1. However, my critical review revealed three findings. Firstly, there is no standard model describing the KM process. Secondly, the existing literature rarely examined the KM processes dimension as a whole. Thirdly, I considered that the models that did offer a more wholistic theory of the KM process dimension could be improved upon.

Therefore, the CISUS model that I have developed synthesises and integrates the main parts of what existing models offer, and thus constitutes a conceptual framework for the KM process dimension model that this study has adopted. Whilst complexity exists within each of the CISUS processes, the process dimension becomes even more complex when the interactions among all five of the CISUS processes are considered as a whole.

Applying this CISUS model to the study context of a research team immediately identifies gaps in knowledge for further research. For example, it has been stated that knowledge sharing can deliver benefits to organisations, and has been a widely discussed topic in the multidisciplinary literature; however, much still remains to be studied about knowledge sharing (Wang & Noe, 2010). The CISUS architecture asserts that knowledge sharing is just one of the five CISUS KM processes in which a research team must engage to be effective. That is, the individuals within the team must first create and improve new knowledge, based on their use of stored knowledge, and then be recognised for sharing this new knowledge with peers. If much still remains to be studied on just the knowledge sharing process (Wang & Noe, 2010), this implies even more remains to be studied if one wholistically considers *all five* CISUS processes *simultaneously*, in relation to ere appears to university research teams. This gap within the research literature therefore warranted further research to explore *how* research teams construct KM capacity, with reference to the CISUS KM process dimension model (Matthews, 2012a).

2.5 The KM Human Dimension

The human dimension of KM is also discussed in a substantial body of literature that considers the influence of different human factors on KM. A brief overview of the human dimension is discussed below, before focusing on one particular subdimension, the MBTI

personality preference. Thus this study explores the MBTI preferences of the participants in relation to constructing KM capacity.

2.5.1 Overview of the Human Dimension

It is necessary first to provide an overview of the human dimension in order to show the value and breadth of the topic in relation to understanding KM. Many contemporary organisations acknowledge that people are their greatest asset, and these human assets must be properly understood and measured if they are to deliver full value (Coppin, 2017). "It is people and their knowledge assets that are actually the central elements of KM" (Zhang, 2009, p. 238). Today's organisations are often multicultural networks, which introduces multiple human factors, which in turn requires greater awareness to avoid misunderstandings (Weilkiens, 2016). Human interaction dynamics can have dramatic impacts on the organisational "success and failure" of initiatives (Rivard, Aubert, Patry, Pare, & Smith, 2004, p. 233). It is suggested that the human factor perspective should be considered in accepting and using knowledge (Heisig et al., 2016). Knowledge is produced in the interactions between people (Castells, 2010). All of these points emphasise the importance of the human dimension.

It is recognised that the human dimension is complex (Newton, n.d) and unpredictable (Hawking, n.d.-b), yet also that we must all build our skill in the affairs of the human dimension, or else risk becoming misologues or misanthropes (Grube, 1997). These points underline the complexity of the human dimension, and the need to understand it better. One reason for the human dimension's complexity is that there is such a wide range of subdimensional variables with diversity in each subdimension. For example, one study concluded that the relationship between the human diversity in academic research

teams and the team performance was not simple, and could depend on the particular human diversity attributes suited to the team context (De Saá-Pérez, Díaz-Díaz, Aguiar-Díaz, & Ballesteros-Rodríguez, 2017).

As part of this thesis, I contemplated a range of these diverse subdimensional attributes within the human dimension, with readings on health (World Health Organisation [WHO], 2001), disability (The Para-Olympic Movement, 2016), and personality (Church, 2017; Vernon, 2014), to name a few. This range represents only a small fraction of the total human dimension, and the scholarly literature continues to expand, adding to the complexity of this topic.

The literature review concluded that the management of the human dimension has long been recognised as an issue (Handy 1996), and research to integrate human KM approaches is ongoing (Turner & Minonne, 2010). One significant managerial challenge is to understand human relationships, and how their knowledge should be managed (Agndal & Nilsson, 2006). More research needs to be conducted that focuses on the human dimension in the business environment (Quinn, 2005). It is recognised that all dimensions of KM need to be informed by rigorous human systems research, including the exploration of the human dimension issues and concepts (Department of Defence, 2009, p. 3.48). It is also recognised that it is vital to design and deliver learning to address individual needs (Benson-Armer, Silke-Susann, & Webster, 2014), and that one's culture shapes one's decisions; thus an appreciation of the philosophy and psychology of culture can provide insights into the choices made (Nisbett, 2004). With that broader perspective on the scope and importance of the human dimension in mind, the psychological subdimension of personality is further discussed in the following subsections.

2.5.2 Personality Preferences

One attribute of the human subdimension is an individual's personality-based preferences, which is a particular aspect that is explored in this study. In this subsection of the chapter, the literature pertaining to personality preferences is reviewed to provide a contemporary perspective on how the human subdimension of personality may influence KM capacity.

Prior to the 19th century, psychological speculation was something generally carried out by philosophers; however, by the last quarter of the 19th century, it had become a recognised field in universities (Robbins, 2000). Today there is a plethora of studies of personalities (Sangster, 2011). Indeed, attempts to describe and detail the human dimension of personality have a long history, and there are many methods and tools to aid understanding of this human dimension. Since the dawn of time, humans have tried to describe their personalities, leading to a variety of models, all of them trying to fit something as complex and fluid as the human personality into certain categories, thus representing only a simplification of reality (Weilkiens, 2016). Studies have shown that in human psychology our personality is believed to make up who we are and can be used to determine how we respond to certain situations, allowing behavioural prediction, and it has also been shown that some animals, such as sharks, possess personality as well (Byrnes & Brown, 2016; Carere & Locurto, 2011). By better understanding our personalities, we gain illuminating insights into our identities (Kashdan, 2014).

However, it is remarkable that, in the discipline of KM, there has been limited consideration of many key findings from management science and psychology (Taylor, 2004). Therefore "there is justification to investigate the influence of cognitive style on KM practice, yet it has been under-researched" (Taylor, 2004, p. 54). Although team personality

composition appears to be a relatively robust predictor of team effectiveness, research suggests that the actual task and the amount of member interaction may require different personality compositions for effective performance, and this is a topic that requires further investigation (Kozlowski & Bell, 2003).

Even within the human subdimension of personality, there are multiple aspects to consider. "Temperament theory can be traced back to ancient Greece and Hippocrates around 450 BCE" (Quinn, 2005, p. 76). Some have used the Latin term "habitus" in its broadest sense to denote not a sum of the human character parts but a more nearly all-encompassing modality of action that assigns rank and influence to the components of personality (Bourdieu & Passeron, 1977; Robbins, 2005). In fact, there are many human subdimensions of personality that have been identified, including the NEO-Personality Inventory(PI) Five-Factor Model (Costa & McCrae, 1992), the Experiential Learning Theory (ELT) with its corresponding Learning Styles Inventory (Kolb, 1984), and the Enneagram (Kaluzniacky, 2004). Another method to help to understand the human subdimension of personality is the Myer-Briggs Type Indicator (MBTI[1]) instrument (Myers, McCaulley, Quenk, & Hammer, 2003).

Overall then, numerous methods exist to assess individuals' human dimension, with each method offering some benefit to the overall goal of understanding human capacity. There does not appear to be one complete, unified, holistic method of assessing human capacity, nor one instrument that is perfect and without criticism. For this study, which was

[1] The Myers-Briggs Type Indicator, Myers-Briggs, and MBTI are trademarks of the Myers-Briggs Type Indicator Trust in the United States and other countries.

focused on KM in the context of research teams, only the MBTI instrument was applied, as is described and justified in the following subsections.

2.5.3 The MBTI Background

Carl Gustav Jung (1875-1961) was a Swiss psychiatrist who studied psychological types (Jung, 1921/1971). The essence of Jung's type theory was that "human behaviour is influenced by individuals' preferences in the ways they use their perceptions and judgments" (Myers et al., 2003, p. 3). Jung's theories to characterise people by their preferences have since become very influential in personality typology (Weilkiens, 2016).

By 1926, Katharine Cook-Briggs (1875-1968) had further developed Jung's personality typology dichotomies into an early MBTI instrument to forms one's personality portrait (Briggs, 1926; Emre, 2015). Katherine Cook-Briggs and her daughter Isabel Briggs Myers (1897-1980), subsequently elaborated Jung's ideas, leading to the development of the MBTI industry (Emre, 2015). The current purpose of the MBTI personality inventory is "to make the theory of psychological types described by Jung useful in people's lives" (Myers et al., 2003, p. 3). The MBTI is further described below.

2.5.4 The MBTI Instrument Description

The MBTI instrument itself is a self-report inventory that helps to identify preferred personality characteristics (dimensions) according to psychological type. The MBTI measures four bi-polar dimensions of personality (Rushton, 2007). More specifically, the four dichotomies are termed respectively: *Extraversion*[2] *(E)* or *Introversion (I), Sensing (S)*

[2] Extr*a*vert, Extr*a*version, and Extr*a*verted were originally spelled in this manner in *Introduction to Type* by Isabel Briggs Myers, as is cited in other literature, and that spelling is continued in this thesis.

or *Intuition (N[3]), Thinking (T)* or *Feeling (F)* and finally *Judging (J)* or *Perceiving (P)* (Myers et al., 2003). There is considerable documentation outlining the characteristics of each Myers-Briggs dimension (Kaluzniacky, 2004). While everyone can use either dichotomy depending on the situation, individuals tend to have a preference (Quinn, 2012). I often explain this as being similar to using either your left or your right hand to write with – whilst you can use either, you tend to have a preference.

The four dichotomous pairs (E-I, S-N, T-F, J-P) produce 16 combinations of personality types, such as ESTJ, each representing dynamic exchanges with the inner and outer worlds. Basically, psychological type theory considers that each of the 16 types prefers particular behaviours, and the MBTI instrument helps individuals to identify their type (Briggs, 1926; Myers et al., 2003; Rushton, 2007). The MBTI literature reveals individual differences, and their various strengths and weaknesses of each MBTI type. A summarised description of these MBTI dichotomies is provided below. .

2.5.4.1 Extraversion (E) and Introversion (I)

Extraverted individuals obtain information through an orientation towards the outer world of people, events or things. They enjoy the connectivity of meeting new people, thinking aloud and being active. Introverted types are more internally driven, seeking the introspection of ideas, thoughts and concepts. Introverts prefer to process their thoughts internally before speaking, have few close friends and often seek conversations that tend to be deeper in nature.

[3] An uppercase "N" is used to represent Intuitive/Intuition since "I" has already been used to represent Introversion/Introvert.

2.5.4.2 Sensing (S) and Intuition (N)

This relates to individuals' preferences about how they receive and make sense of information or data from the external world. Sensing types are more aware of their senses in relation to their environment, are often factually based, focus on practical, concrete problems and generally believe that if something works it is best left alone. Individuals who tend to understand the world through an Intuitive process prefer to live in a world of possibilities and options, often looking towards the future. They also tend to focus on complicated, abstract problems, seeing the big picture, sometimes at the expense of the details.

2.5.4.3 Thinking (T) and Feeling (F)

This relates to the rational processes by which we come to certain conclusions and judgments regarding the information collected. Thinking types (T) prefer to focus on making decisions based on impersonal, objective positions. Feeling types (F) tend to respond well and easily to people's values and are adept at assessing the human impact of decisions.

2.5.4.4 Judging (J) and Perceiving (P)

This relates to how we live our life outwards. Judging types prefer to live structured, organised lives. They also tend to be self-disciplined, enjoy making decisions and thrive on order. Perceiving types prefer to live a lifestyle that is more flexible and adaptable. They tend to thrive on spontaneity, prefer to leave things open, require more information in order to make decisions and often get things done at the last minute.

2.5.5 Rationale for Using the MBTI in this Study

This background on the MBTI development leads to four good reasons as to why MBTI was selected and applied in this study. These four reasons were the MBTI instrument reliability and validity, the MBTI popularity, the ongoing MBTI research activity and my MBTI qualifications, all of which are discussed further below.

2.5.5.1 The MBTI Reliability and Validity

It must be acknowledged that the MBTI does have its critics, and that particular MBTI limitations and weaknesses appear in the literature. Some critics have debated the instrument's reliability and validity (Boyle, 1995; Hammer & Barger, 1996). Indeed, there are sceptics who have written critiques that repeat the same arguments, that the MBTI instrument is unreliable as people often generate different results when they take it from one week to the next; the type descriptions are loose and baggy enough to fit anyone; and the test's origins were just the hobby of two untrained women (Emre, 2015). One critic recommended caution when making inferences from the 4-letter MBTI type formula, as it may not support the claims that its promoters make (Pittenger, 2005). At the same time, growing evidence regarding the biological basis of psychological types gives credence to Jung's assumption that type is universal (Myers et al., 2003). I accept the view articulated by Kaluzniacky (2004):

> A question often arises as to the consistency of the MBTI result over time. In theory, one's MBTI personality will (usually) not change. In persons who take the questionnaire again after several years, about 75% are said to come out the same on at least three out of [the] four dimensions. However, MBTI results do depend on a reasonable degree of self-knowledge. A person who is relatively young (in his [*sic*

> *passim*] 20s), and who has spent his formative years repressing his true nature, may only at that point be coming into his own. Such a person's MBTI results may change somewhat as a truer self is allowed to emerge. (p. 54)

The body of literature supporting the MBTI's validity and its organisational applications is ever-increasing. The benefits and issues of MBTI assessment has received much attention in the management research literature (Taylor, 2004). The Myers-Briggs type assessment process has been used and refined extensively so that now it possesses generally acceptable levels of validity (Kaluzniacky, 2004). Any issues with faulty self-assessment requires more theoretical and empirical work to understand and resolve (Dunning, Heath, & Suls, 2004). According to MBTI (Jungian) theory, the types are to be regarded as stable traits, and the MBTI instrument has been well tested as a measure of these traits.

Since the publication of the first MBTI Manual (Myers, 1962), the implementation of the MBTI continues to mature, and by 1997 there had been 11 revisions of the MBTI instrument, and more than 4,000 research studies, articles and theses written about it (Myers et al., 2003, p. 10). The current version of the MBTI is the 12th revision, as Form M published in 1998 (Myers et al., 2003, p. 11), suggesting that the MBTI instrument design has matured. Based on this published research about the MBTI Form M and its application, the MBTI Form M instrument was considered suitable for identifying personality preferences, and no pilot testing was required prior to its deployment.

As was outlined above, the developments by Jung (1921/1971), Briggs (1926), Myers (1962, 2003) and others have created a body of research supporting MBTI personality type theory. It is contended that for the purposes of this research the MBTI Form M instrument had suitable reliability as an MBTI measure, and that its reliability was increased by the

qualitative, follow-up interviews where the participants confirmed and validated their preference selections based on further descriptive information. In this way, the test-retest reliability and validity of the MBTI Form M instrument result was further increased, and it was therefore considered to be an appropriate and acceptable instrument for the purposes of this study, which was to glean insight into the human dimension of KM capacity.

2.5.5.2 MBTI Popularity

Overall, the MBTI provides insights into the personality aspects of individuals, and as a result the MBTI has become a popular tool for helping organisations to assist their managers and teams (Strachan, 2002). MBTI preferences have been applied in a wide variety of contexts and professions to analyse learners' and workers' interactions with one another and to maximise the degree of alignment between those interactions and productive outcomes (Muller & Karsten, 2011).

The MBTI is widely used in business, management, team building, career centers and many other areas (Quinn, 2012). The MBTI is considered the most widely used personality instrument in the world, with over two million administrations using the instrument each year (Myers et al., 2003). In business, the most frequently used model is still the four factor MBTI, and tens of thousands of managers have used it (Sangster, 2011). The MBTI is routinely deployed by 89 of the Fortune 100 companies, the United States government, hundreds of universities, and online dating sites, surpassing its competition in the $500 million psychometric testing industry (Emre, 2015). The MBTI is one of the oldest and most popular methods for classifying personality traits for job fitting (Furnham, 1996; Hammer & Barger, 1996). The MBTI has been applied with graduate students (Hogan, 2009), postdoctoral researchers (Blackford, 2010), academics (Fornaciari & Dean, 2013) and middle managers (Ma, 2004), and those similar applications underscored the value of

applying MBTI to a group of education academics in a regional Australian university (Matthews & Danaher, 2015).

The remarkable success of the Myers-Briggs indicator, above all other personality tests, depends on the shared conviction of millions of people and organisations (Emre, 2015). The MBTI popularity stems from its 50 year track record of well-documented research and its versatility for application in multiple contexts – particularly team dynamics (Rycroft, 2012). Based on this track record, the popularity of MBTI positions this study in a relevant area of ongoing scholarship.

2.5.5.3 MBTI Research

Given the growing popularity of the MBTI instrument, an opportunity exists to engage in further research to extend its development. MBTI is the frequent choice of education researchers because of its suitability to applications in teaching and learning (Rushton, 2007), and exploring the influence of cognitive style on KM practice is encouraged because it has been under-researched (Taylor, 2004, p. 62), which suggests a research gap to be explored through study of the MBTI cognitive style. “More work needs to be done to explore how various MBTI types embrace or reject change as related to the workplace of the 21st century and the design, development, and implementation of knowledge management systems” (Quinn, 2005, p. 80). This study explores some MBTI responses, in the context of KM change within a research team.

One’s MBTI personality preference influences one’s behaviour, suggesting the likelihood that MBTI preference will also influence one’s KM practice. It is important to note that a code of ethics guidelines exists pertaining to the administration and use of the MBTI instrument as a personality assessment tool, which highlights the importance of

considering type as being only one aspect of the human dimension (Myers et al., 2003). Personality type is an important component of the complex human personality; however, type does not explain everything, as it does not reflect an individual's ability, intelligence, emotion, or likelihood of success (Centre for Applications of Psychological Type [CAPT], 2013). However, it has been noted that personal status and relations with others strongly influence knowledge sharing (Morey, Maybury, & Thuraisingham, 2002). Therefore, given the ongoing popular demand of the MBTI application in the potentially productive global market (as was highlighted above), this study has further researched the relationship between individual personality preference and KM, and so adds to the body of knowledge about MBTI.

2.5.5.4 MBTI Practitioner Qualifications

An MBTI practitioner qualification is required in order to deploy the MBTI instrument legally. I am a qualified and experienced MBTI practitioner, as is discussed in Section 4.6.1.1, with an interest in further extending MBTI applications to KM. I have experienced personally the insights that one receives from better understanding the MBTI personality preference, and as a qualified MBTI practitioner. My MBTI qualifications and experiences have convinced me that the MBTI insights can be very empowering, and over the last 15 years I have come to appreciate the value that the MBTI insights offer to benefit many aspects of human interactions, and this provides a good reason to utilise the MBTI in my research interests.

2.5.6 Conclusion to the Human Dimension

Therefore, despite many other potentially valid instruments, it was the four reasons above – the MBTI validity, popularity in organisations, the developing body of research

knowledge and my own practitioner skills to deploy the instrument – that influenced me to select the MBTI for this case study. In conclusion, this study established that exploring the MBTI personality provides a useful method for this study to delve into how and why this particular aspect of the human dimension influences the construction of KM capacity. I have thus utilised the MBTI as my diagnostic tool to gain deeper insight into, and to explore the relationships within, the human dimension profile dynamics of case study participants, and thereby to add to the body of knowledge on this specific gap in the literature.

2.6 The KM Technology Dimension

This section explores the third KM dimension, namely the technology dimension, to reveal how technologies are relevant to consider within the context of my study. Universities have undergone rapid transformation with the introduction of new technology. In reviewing this KM technology dimension literature, I provide a perspective on the evolution of this dimension, noting the historical background of the KM technology dimension and how it is evolving rapidly to include mobile applications, enabling humanity to potentially manage knowledge better. A review of selected literature about the technology dimension follows, highlighting the technology use and skill aspects being considered in this study with reference to the human and process KM dimensions.

2.6.1 Overview of the Technology Dimension

There has been recent and accelerated impact of the technology dimension. For example, in the agricultural (or Neolithic) revolution (10,000BCE) humans used primitive technologies for survival (Bocquet-Appel, 2011). Then, 200 years ago, the Industrial Revolution freed us from the limits of our physical muscle power. Now, with the rise of computers, we are being freed from the intellectual limits of our brain power (Brynjolfsson

& McAfee, 2014). The overwhelming majority of technology that we use in daily life today have been developed within the last 100 years (Toffler, 1970).

The rise of the contemporary computer technology is only recent. However, there is some evidence of ancient computers of sorts (Angelakis, 2005). Over the past 150 years, there has been an explosion of knowledge sharing technologies including the telegraph (~1840), the telephone (~1873), radio (~1894), television (~1925), coloured film (~1930), colour television (~1940) and then the invention of the electronic computer (~1943), which led to Internet developments from the 1960s to the present day (Gleick, 2011)

In the 1960s, the silicon semiconductor transistor was invented, rapidly developed (Moore, 1965, p. 115) and continues to develop (Simonite, 2016) using increasing levels of electrical power (Overton, 2016). As a result, the speed of computers has doubled almost 27 times since 1958, being analogous to a car starting out travelling at five miles per hour is now travelling at 671 million miles per hour (Ford, 2015). Through this engineering development of computer power and speed, contemporary KM technologies such as smart phones have arisen. Our current life support systems on a planet of 7.5 billion people and rising now depend on this contemporary technology (Bridle, 2018).

My point of this historical background on the technology dimension is to reveal the recent impact that KM technology has had on the contemporary world. This impact is likely to continue, with recent experiments implanting computers as a Brain Machine Interface (BMI), enabling direct brain-to-brain communication in humans (Beth Israel Deaconess Medical Center, 2014) and hyper-connectivity catalysing a networked economy (Massachusetts Institute of Technology [MIT], 2014) of global trade.

Therefore, for the contemporary knowledge worker, adopting and adapting to these new KM technologies poses an ongoing challenge. The upside is that utilising modern KM technologies makes managing knowledge more effective and valuable and demands less time and effort from employees (Wiig, 2004). Technology networks now enable billions of people and businesses to communicate, collaborate, and commercialise all around planet Earth in a new form of society, a network society (Castells, 2010).

Many organisations are actively developing KM process–technology–human dimension integration. One leading example of this integration is the Australian Department of Defence (Department of Defence, 2008, 2009). The technology dimension, particularly web 2.0 technology, provides new opportunities for organisations to utilise the human dimension of personal knowledge assets (Zhang, 2009). There has been an exponential increase in the network of devices connected via the Internet of Things (IoT), where businesses, processes, data and things can be connected, from about 900 million connected devices in 2009 and projected to be more than 26 billion by 2020 (Massachusetts Institute of Technology [MIT], 2014).

The impact of the KM technology dimension revolution on knowledge workers will continue. In 2010, the CEO of Google stated that every two days humanity created as much information as we did from the dawn of civilisation up until 2003, in the order of five exabytes of data, and that the world is not ready for the technology revolution that will be happening to them soon (Siegler, 2010). Organisations are using technology to improve business effectiveness and efficiency, not just to manage costs (Khan & Sikes, 2014). Whilst the original vision of the World Wide Web Internet invention appears to have been that of a technology to share information and knowledge through dispersed computer networks (Berners-Lee, 1989, 1998) the appearance of Web 2.0 in the early 2000s, and the

current evolution of Web 3.0 "provides a multimodal, multichannel system of digital communication that integrates all forms of media." (Castells, 2010, p. xxvii). "Web 2.0 technologies enable evolution to a horizontal (connect and collaborate) model of operation" (Gilbert, 2005, p. 17). The Internet as a medium for communication is as profound as any other invention in the history of humankind (Anderson & Kanuka, 2003, p. 43). People can now work across time, space and organisational boundaries with links strengthened by webs of communication technologies (Linpack & Stamps, 1997).

With the evolution of the technology dimension now stretching beyond Web 2.0, the human dimension has undergone a process of continual discovery regarding the uses and benefits of being able to manage knowledge in new ways. Living in a "wired" world both allows us and compels us to rethink pre-Internet concepts of communication, time, space, access to information, possibilities for collaboration, networking and methods of decision-making (Siemens, 2006). The technology aspects of KM applications have been actively developed, yet there is still considerable development potential in the human dimension (Department of Defence, 2007, p. iii).

The future KM technology dimension, with its core being interconnected computers and the Internet, continues to be the subject of much international discourse, research, development and investment. Whilst there are many aspects of technology that could be contemplated, for the purposes of this study only two specific subdimensions of the KM technology dimension were considered: Information and Communication Technology (ICT) usage and ICT skill. These two subdimensions were deemed to be relevant in the context of a university research team, comprising knowledge workers whose technology use and skill levels could be measured within this study's limitations.

2.6.2 ICT Tools

ICT tools are used by university research team members to benefit their KM operations. That is, ICTs help to facilitate their KM processes (Jayasingam, Ansari, Ramayah, & Jantan, 2012; Soto-Acosta et al., 2014; Soto-Acosta, Popa, & Palacios-Marqués, 2015). With the recent appearance of Web 2.0, the term "KM 2.0" has been coined to summarise new trends in KM, with KM 2.0 being defined as the acquisition, creation and sharing of collective intelligence through social networks and communities of knowledge (Sigala & Chalkiti, 2014). ICT tools, especially social media, have been considered essential to achieving KM in a community of co-workers (Pohjola & Puusa, 2016).

Thus, the evolution of ICT tools has been a significant enabler for KM development (Matthews, 2004), and the technological revolution (McKee & Tutty, 2012) is heralded as a second machine age (Brynjolfsson & McAfee, 2014). ICT tools facilitate knowledge acquisition, creation, dissemination and utilisation (Jayasingam et al., 2012; Soto-Acosta et al., 2014), highlighting that the technology dimension of ICT facilitates the process dimension of KM. Many practitioners have developed guidelines for KM where technology tools are seen as an aid rather than an outcome (Chen, 2012). One view is that digital technologies are just a means, not the end. The end is the person, with a human nature, and it is essential to understand the behaviours, desires, motivations, passions and needs of people and then to use technology to help the people improve their lives (Ahmed & Olander, 2012).

The contemporary integration of ICT tools has enabled KM to evolve rapidly. Currently, such ICTs include email (asynchronous word and file sharing), video conferencing (synchronous, visual, face-face conversations) and web/social media sites (for

the synchronous or asynchronous sharing of written words, sound and moving images). These contemporary ICTs enable KM to traverse the globe almost instantly.

The point of this historical perspective is to emphasise how ICT tools have evolved human knowledge sharing over the last 100 years, and how this impacts on the research team environment. It is likely that ICT tools will continue to evolve, extending knowledge reach across space, time and context. In this way, the technology dimension influences the whole process dimension, impacting on the create, improve, store use and share processes of a research team's KM operations, as well as the human.

To amplify my point of KM technology dimension in the university context, Facebook launched in 2004 and went global in 2006, YouTube appeared in 2005, Twitter launched in 2006, Instagram in 2010 (acquired by Facebook in 2012) and Snapchat in 2011 (Muller, 2018) influencing personal communications. Similarly, "Wikipedia", a free online encyclopedia, launched in 2001with the vision to provide every single person on the planet with free access to the sum of all human knowledge, in their own language (Wales, 2004). In mid-2016, Wikipedia was the world's sixth most popular website, with a total of over 36 million articles (over 5 million in English) across all 291 language editions, and received around 500 million unique visitors every month (Wikipedia, 2016). These examples, particularly that of Wikipedia, reveal just how staggering the scale and speed of spread that these technology tools have had within the broader context of the university research team.

For the university research team, the Wikipedia site is just *one* of a multitude of knowledge repositories that are becoming increasingly relevant to the nature of academic research, with other sites being online journal databases and Google searches. With each technology dimension site providing information for KM, the scope of these ICT tools is immense. Without this ICT revolution, information and KM would not be such a significant

issue; we would all still be reading books, posting letters and sharing word of mouth; KM at a "snail-mail" speed as it was last century. Humans in this century manage knowledge at "light-speed" (facilitated by mobile ICTs), with growing expectations for instant, global connectivity. Indeed, the analogy has been made that we are all now connected by the Internet, like neurons in a giant brain (Hawking, n.d.-a). The university research team is in effect one of those neurons, engaging with other neurons across the global human network via KM technology tools. It must also be noted that the future of KM technology is moving toward virtual reality, artificial intelligence, and robotics (Brynjolfsson & McAfee, 2014; Ford, 2015; Foss, 2007). Therefore, my study provides a timely snapshot of how and why knowledge workers construct their KM capacity with contemporary KM technology dimension tools.

2.6.3 ICT Usage

In the context of a university research team, ICT for KM use continues to evolve, and there is a growing realisation that traditional ways of using and organising knowledge are being challenged by the technology dimension. A great expansion of recorded knowledge has been brought about by the Internet (Hider & Harvey, 2008). Whilst it has been argued that the literature is lacking in its ability to theorise the role of technology in a contemporary society (Orlikowski & Iacono, 2001), this discourse is continually evolving and maturing (Lu & Ren, 2018; Zheng, Hatakka, Sahay, & Andersson, 2018). That lag should come as no surprise though, because with the rapid development of technology tools, and the subsequent use of these tools, theories of and research into technology use are naturally going to remain in perpetual catch-up mode. For example, if the proposed semantic web technology becomes a reality, it will further revolutionise how knowledge is organised and

accessed (Hider & Harvey, 2008) and the subsequent research and theory will need to race to catch up with that semantic web reality.

Despite its crucial role in managing organisational knowledge assets, technology residing only at the organisational level is insufficient - KM technologies must be integrated into the team, with team members empowered to utilise them, for productive benefits to occur (Zhang, 2009, p. 238). In recent years, the world has become increasingly networked, with distant and diverse regions having been linked into a constant flow of information exchange facilitated by the Internet, GPS-enabled camera phones, camcorders, CCTV surveillance device and new online shopping, banking and communications practices (Blake & Reyes, 2016). It has also become recognised how critical information and knowledge flows through modern society to influence and agitate for change (Assange, 2011).

Technology networking further introduces the risk of one's privacy being compromised by surveillance, data tracking and data retention technologies. The director of Amnesty International UK has raised concerns that the Big Brother surveillance state that George Orwell warned of back in 1949 is alive and dangerously well in Europe today (Bowcott, 2017). I have previously highlighted this shift to integrate various databases (Matthews, 2004) and 12 years later, there are revelations that the Australian Bureau of Statistics (ABS) has quietly been creeping up its capacity to link various information sets about individuals, and then longitudinally track those individuals' developments (Martic, 2016). Yet many people are blissfully ignorant of these negative impacts of technology, and share their data and information without necessarily realising the KM implications (Gordon-Levitt, 2016) are increasing (Besser, 2016) and that malware, ransomware and theft are a real threat (Korolov, 2016). Using non-secure technology is rather like leaving

one's front door open when leaving the house (Brandon, 2016). These issues of interconnectedness, privacy and security are technology dimension risk factors that influence the context of contemporary university research teams.

The technology dimension capacity for information processing power is growing at an exponential rate. (Hilbert & López, 2011) and ICT used around the world is accelerating, with about 1.5 billion Internet users in 2009 - around one-fifth of the world's population (Castells, 2010). The Internet, with its diverse range of applications, is the communication fabric of our lives, for work, connection, information, entertainment, public services, and politics (Castells 2010). In the context of a university team, the internet is used for education and for publishing, and this can now be done wirelessly. Wireless KM technologies have been the fastest diffusing technology in the history of communication, reaching 60 percent of the world by 2009 (Castells, 2010).

The technology and human dimension are closely integrated, influencing how we communicate. .A relationship has previously been shown between spatial distance and communication frequency, as depicted in "Allen Curve", suggesting that we are much more likely to communicate with someone in close proximity, and that distance is detrimental to communication (Allen, 1977; Weilkiens, 2016). However, the Dynamic Impact of Social Connectivity (DISC) theory (Matthews & Danaher, 2011) suggests that as the ICT technology advances better tools in the future, physical distance will no longer be a barrier to human communication. Thus the Allen curve will, like the smoke signal, eventually become obsolete.

The technology and human dimension also shows that use of ICTs for KM is influenced by the individual differences in cognitive style (Taylor, 2004). Also, the study of ergonomics (such as human-machine interfaces) recognises the human-technology

dimension relationship, as has the Socio-Technical Systems (STS) approach (Pan & Scarbrough, 1999). Organisations need to recognise the diversity of the workforce and accommodate gender and cognitive style differences into their KM strategies (Taylor, 2004). Over the last century, technological acceleration has transformed our planet, our societies, and ourselves, but it has failed to transform our understanding of these things (Bridle, 2018). Thus, despite all the technology dimensional ICT developments mentioned above, it is the interactions of the technology dimension with the process and human dimension are vital to KM, even in the context of a university research team.

2.6.4 The Impact of Technology on the KM Process and Human Dimensions

It is important to acknowledge here that the technology dimension has significantly influenced the KM process dimension, through recent ICT hardware and software revolutions. For example, it has been recognised that ICTs help to facilitate the KM processes of knowledge acquisition and creation, knowledge dissemination and knowledge utilisation (Jayasingam, Ansari, Ramayah, & Jantan, 2012; Soto-Acosta, Colomo-Palacios, & Popa, 2014, 2015). Owing to the recent influence of ICT-based systems on the management of knowledge, some KM terminology perception differences exist in the literature and the organisation, depending on whether the user is focused on ICT or on applying knowledge (Jennex & Olfman, 2002).

With the recent appearance of Web 2.0, the term "KM 2.0" has been coined to reflect trends in KM related to Web 2.0, with KM 2.0 being defined as the process of the acquisition, creation and sharing of collective intelligence through social networks and communities of knowledge (Sigala & Chalkiti, 2014). Ultimately, the goal of KM is to assist the transfer (sharing) process of knowledge between knowledge workers (Cooper,

2003). Realistically, both the technology and the processes are required for knowledge to be successfully integrated (Holsapple & Joshi, 2000).

It is important to note that the literature analysed above supports the KM process and technology dimension being closely integrated, and it is therefore likely that as the KM technology dimension continues to evolve it will further impact and influence the KM process dimension. Also, as the technology dimension becomes more sophisticated, a greater emphasis on integrating the human dimension is needed (Department of Defence, 2009, p. 3.45). Thus the technology implications for a research team context are clear, present and increasingly impacting their human and process dimension activities.

2.6.5 Conclusion to the Technology Dimension

The technology dimension is underlined by the contemporary technology revolution, which has had significant influence on KM operations. Fundamentally, research about KM is addressed in the literature; however, technology dimension developments are rapidly evolving contemporary KM practice. Global society, including university research teams, is embracing the KM opportunities that this technology dimension enables.

2.7 The Four KM Dimensions: A Wholistic Approach to KM

The literature readily acknowledges consideration of the first three KM dimensions, with the process, human and technology dimensions discussed individually above in Sections 2.3, 2.4 and 2.5 respectively. I now argue that in order to understand KM more comprehensively, the KM context dimension should be given more consideration. A critical analysis of the literature to justify the inclusion of this fourth KM dimension of context in this study is provided below.

2.7.0 Two-Dimensional KM Models

The two KM dimensions of human and technology have previously been considered in conjunction, rather than in isolation. For example, KM has long been considered to involve both the human and the technology dimensions (Sveiby, 1997). KM has also included human-centric (human dimension) and techno-centric (technology dimension) views (Nazim & Mukherjee, 2016). Another view is that KM involves both soft and hard systems, with the soft system being the human dimension networks, and the hard system being the formal storage/documentation systems (Hlupic, Pouloudi, & Rzevski, 2002; Somasundaram & Danaher, 2008), with those hard systems thus involving the process and technology dimensions.

2.7.1 Three-Dimensional KM Models

Three KM dimension have also been considered in combination. For example, KM has been divided into its three main dimensions; process, human and technology. KM includes the process, human and technology dimensions (Ermine, 2008; Lehner & Haas, 2010; Oliver, 2003; Rodriguez & Edwards, 2010). KM encompasses a broad range of areas that encompass "human behavior, attitudes and capabilities, business philosophies, models, operations and practices, and complicated technologies" (Wiig, 2004, p. 235). The KM literature has focused on the process, human/people, and technology dimensions. It is vital to understand the interaction patterns among the KM processes, humans, and technologies (Bhatt, 2001).

Indeed, the benefits of considering all three KM dimensions in conjunction are noted in the literature. Research has suggested that, when both the human and the technology dimensions are managed to enable both explicit and tacit knowledge processes (process

dimension), doing so provides an advantage to innovation performance (Gloet & Terziovski, 2004; Venters, Mondale, & Scott, 2006). Likewise, KM incorporates "the set of processes, practices, and technologies (process and technology dimensions) that aim to leverage the intellectual capital (human dimension) of an organisation and enable it to make more effective use of its assets" (Rivard et al., 2004, p. 267). Another view of KM is that one can have every shiny box on the market (technology dimension), but if one does not have the right people (human dimension) and processes (process dimension) one is wasting one's time and money (Sann, 2016). Similarly, technologies (technology dimension) can be used to increase the efficiency of the people (human dimension) and to enhance the information flow processes (process dimension), by bringing into effect multiple views to improve interpretations of the information (Bhatt, 2001). For KM in a networked organisation, there is a relationship between the technology dimension and the human dimension whereby technological connectivity enables interoperability and synchronised action (through the process dimension), and therefore an organisation must continue to invest resources in order to integrate the technology and human dimensions (Department of Defence, 2009). This supports the notion that it is beneficial to integrate the interactions of the process, human and technology dimensions of KM, rather than managing them separately, and in isolation from one another.

2.7.2 The Metaphorical KM Elephant

To emphasise further a gap in this current three-dimensional approach to KM, I now introduce my metaphorical "KM elephant". The "KM elephant" metaphor is adapted from an ancient Indian philosophy contemplating an elephant in a room. Imagine four people in a dark room, trying to describe the thing in front of them (which we know is an elephant). One has hold of the tail and describes it as a rope. Another grabs the leg and argues that it

is more like a pole, and the one faced with the tusk defines it as a spear. The intention of this metaphor is to point out that all observers may be somewhat correct in their own way, yet, without considering each perspective and dimension as a unified whole, they fail to see the elephant in its entirety.

For real elephants in nature, there is in fact an astounding wealth of information available, resulting from teams of researchers patiently observing them for decades (Keiper, 2013). The metaphorical KM elephant is more elusive, and knowledge workers are all in that dark room, trying to understand this huge "KM elephant" with which our human species is fumbling. I refer to my "KM elephant" metaphor throughout this thesis in order to reiterate the wholistic focus of this study.

This KM elephant metaphor highlights the importance of considering a fourth KM dimension: context. Bruce Lee's philosophy was that "When your finger is pointing at the moon, one should not concentrate on the finger, otherwise you won't see all of the heavenly glory" (Allin, 1973). Transposing Bruce Lee's philosophy to the KM elephant metaphor, it suggests that, if one concentrates only on one specific part of the "KM elephant", one fails to see the glory of the whole elephant. I acknowledge that the detail within each part of this metaphorical "KM elephant" is definitely important. However, in attempting to see the metaphorical "KM elephant" in all its glory, the contemplation of the context dimension is vital.

Continuing with my "KM elephant" metaphor, the context dimension enables one's perspective to vary depending on whether the elephant is contextualised in a dark room, in the jungle, in the zoo or perhaps leading an ancient army. In each case, the elephant's KM context differs, and so the human, technology and process dimensions related to that "KM elephant" will also differ. A thought experiment that compares the KM process, human and

technology dimensions of an ancient, Indigenous Asian community context with those in a contemporary Australian university research team context suggests that there are likely to be substantial differences owing to their different contexts. The contextual view is necessary to appreciate the unique and relevant KM environment influencing the process, human and technology dimensions of KM.

Applying my "KM elephant" metaphor insights, then, I argue that a fourth "context" dimension should be added to the existing three-dimensional view, in order to consider the "KM elephant" in all its wholistic glory.

2.7.3 The Four-Dimensional KM Model

Incorporating the context dimension provides a broader, situational view in relation to the other KM dimensions. The influence of the context dimension on KM has already been acknowledged in the literature. For example, context is central to understanding human interactions (Flyvbjerg, 2001). "Explanations of social phenomena provided by social scientists have to be appreciated analytically as the products of the social situations of those scientists" (Robbins, 2000, p. viii). That is, to understand the human dimension interactions, it is important first to appreciate the context dimension.

Others have also recognised the importance of understanding the context dimension. For example, another recent study noted that KM models need to be examined to determine whether all the elements that they represent are relevant to the particular context under scrutiny (Lwoga, Ngulube, & Christine, 2017). Human knowledge and behavior are influenced by a complex interaction of contextual influences (Critser, 2003; Dollman & Norton, 2005; Egger, Pearson, Pal, & Swinburn, 2007; Franks, Ravussin, & Hanso, 2005;

Hills, King, & Armstrong, 2007; MacDonald & Wright, 2003; World Health Organisation [WHO], 2002).

Considerable material has been written about KM, psychological type and temperament (human dimension), as well as technology (technology dimension) and change (process dimension) as separate topics. However "it is difficult to locate material addressing these areas in an interdisciplinary fashion" (Quinn, 2005, p. 74). And, as interdisciplinary ways of thinking are relatively new and exploratory, they may be more disorganised and fragmentary than established forms of knowledge (Moran, 2010). Understanding of the context dimension will assist in connecting these interdisciplinary, multidimensional, KM developments.

Accordingly, it is necessary to understand the context dimension in relation to the process, human and technology dimensions, and vice versa. This was highlighted in a recent study that suggested how different contexts suited different human dimension attributes (De Saá-Pérez et al., 2017). This can be colloquially understood as "horses for courses". In that way, a Clydesdale horse breed has never won the Melbourne Cup. This is due to the Clydesdale having the attributes of a work horse, and, instead of racing, it was busy building Australia (Edwards, Langrish, & Houghton, 1994). Thus, the capacity and value of the Clydesdale horse breeds' attributes are related to its context. This emphasises the previous point, that different KM contexts will suit different human dimension attributes. It is therefore important to understand the context of my particular study, so that the specific process, human and technology dimensional details are considered within that context, rather than in another context where the KM process, human and technology dynamics may be totally different.

Despite the context dimension being acknowledged as important, it is rarely incorporated into KM models. The context dimension is important to consider in learning design (i.e., a KM related topic), yet it is often not considered (Griffiths & Inman, 2017). I therefore include the context dimension in this study's KM model, in order to comprehend the overall "wholistic" (refer to Appendix A) interactions among the other three (process, human and technology) KM dimensions, and to understand the *how* and *why* of KM.

Including the context dimension in combination with the process, human and technology dimensions results in a four-dimensional view of KM. In this way, the context dimension enables a more wholistic view of the overall "KM elephant". There is a need for a wholistic KM model, evident in the divergent views on KM and lack of mature understanding of the topic (Diakoulakis, Georgopoulos, Koulouriotis, & Emiris, 2004). Wholistic studies of KM have been attempted, with one recent study aiming to integrate KM enablers, such as culture and management support, into the assessment of the benefits derived from KM, concluding that KM involves a complex system (Mousavizadeh, Harden, Ryan, & Windsor, 2015). It has also been recognised that the complexity involved in such an integrated (wholistic) approach will continue to increase as knowledge and practice develop (Assudani, 2005; Gherardi, 2006).

My study thus pursues this gap in KM understanding by wholistically exploring the four dimensions of KM: process, human, technology and context. This four-dimensional KM conceptual framework is further developed in Chapter 3 of this thesis, for application in this study. The following subsection addresses the literature related to the KM context dimension of this study, with respect to the case study research team.

2.8 The KM Context Dimension: A University Research Team

This study's context dimension is situated within a research team in the (then) education faculty of a regional Australian university. Context is often the key to understanding effects in education (Nisbet & Watt, 1984). It is important to consider the unique socio-cultural and environmental contexts of particular groups and communities (Stokols, Grzywacz, McMahan, & Phillips, 2003, p. 5). The context of KM can also be framed by place and space (Matthews & Danaher, 2015). The relationship between meaning and power can be conceptualised as the space of flows and the space of places, whereby functionality, wealth and power are defined in terms of flows, whilst cultural and social meanings are defined in terms of places (Castells, 2010).

The "bigger place" and "smaller space" subdimensions provide insight into the study context dimension as they assist in framing the particular process, human and technology dimension perspectives that have been discussed in the previous sections. In terms of this place and space concept, the background literature related to this case study is now considered. To do this, this study context dimension was framed by these two subdimensions of place and space.

In terms of the "bigger place", literature is provided on the reality of a regional Australian university over the 2011-2012 timeframe that was the data collection period impacting on the participants. Next, in terms of the "smaller space", the participants were situated within an education research team, and so some literature related to this is also provided. These two context aspects, the bigger "university place" and smaller "team space", are addressed in the following subsections for consideration within the study.

2.8.1 Place: The Australian Regional University

Contemporary universities face multiple challenges to maintain educational standards, including an evolving KM environment and a changing team culture. The concept of university education has been in existence for centuries, yet universities continue to evolve and develop and evolve culturally. Cultural aspects have been identified in the KM literature as a critical element of the adoption and sustained success of KM programs (Chong & Choi, 2005; Davenport & Prusak, 2000; Nonaka & Takeuchi, 1995; Oliver & Kandadi, 2006). The literature consistently highlighted cultural factors, at multiple levels, as the biggest barrier to garnering engagement with and support for KM activities (Chong & Choi, 2005; Chua & Lam, 2005; Malhotra, 2004; Riege, 2005). Cultural changes have been thrust onto contemporary organisational staff members. In the last 30 years of management, organisational staff members have been "zero defected, total quality managed, micromanaged, one-minute managed, synergized, had paradigms shifted, decreased their habits to seven, leaned, six-sigma'd, processes reengineered, and OODA-looped" (Briding, 2016, p. 10).

All of these cultural philosophies within the context dimension of university higher education have also influenced the KM human, technology and process dimensions. The higher education system in Australia comprises 39 universities, all previously audited by the Australian Universities Quality Agency (AUQA) (Woodhouse & Stella, 2011). Over the 2011-2012 timeframe, the Tertiary Education Quality and Standards Agency (TEQSA) became the Commonwealth Government's higher education regulator of the university systems and processes, providing external validation through the assessments undertaken. TEQSA's role is to register higher education providers and to assess their ongoing performance against the Higher Education Standards. The point of explaining this is firstly

to contextualise that the university did have an auditing body providing guidance, and secondly that this auditing body was in a state of change over the data collection period.

As a result of this changing university culture, including the audit culture, the university was also evolving. An area of increasing university research interest is the challenges that doctorate-granting universities face in maintaining effective teaching and service while developing an identity for research, as research productivity benefits the university enrolments, retention, teaching and professional development as well as industry and community (Gregorutti, 2011). Such research outputs are one indicator in the university ranking systems, which in turn influence perceptions of a university's prestige. A managerialist culture, based on strong forms of executive control and management practices, began to dominate Australian higher education at the turn of the 21st century (Winter, Taylor, & Sarros, 2000). This has arguably impacted negatively on the previous learning culture (Marginson & Considine, 2000).

Within the university where this case study was located, the role and identity of each participant researcher continued to evolve. This was evidenced by the case study site university research plan (2013-15) released during this study's data collection period, which advocated particular research priorities and a restructure into program teams to "foster collaboration, mentorship, and leadership which are fundamental for a vibrant research culture" (Case Study University, 2012, p. 5)[4]. As a result, the KM context dimension of the academic research culture in this university was evolving.

[4] Publication anonymised to protect participant confidentiality, however available to examiners by request

Another context aspect of the contemporary university is the changing nature of staff work related to managing knowledge. "Employees in the 21st century workplace constantly complain that they suffer from information overload as knowledge doubles approximately every seven years" (Quinn, 2005, p. 78). This changing culture has impacted on academics and on their work practices by increasing the administrative load in relation to teaching and moving towards the standardisation of academic work to meet Australian Federal Government demands for quality assurance reporting (Martin, 1999). The skilled practice of KM is theoretically linked with the field of education through the concepts of "funds of knowledge" (the knowledge and skills that groups need to function effectively) (Gonzalez, Moll, & Amanti, 2005) and social constructivism (as is defined in Section 4.3.3) (Denzin & Lincoln, 2011; Piaget & Inhelder, 1969; Somekh et al., 2011).

The culture and work practices within the case study site university - the organisational level of my study context - were continually improving towards best KM practice. Universities must promote KM transformation at all levels (Milam, 2005) in order to accomplish performance targets. Over the last 20 years, universities have moved towards corporate style management, where the university is a business delivering products and services rather than a freely-thinking, creative place (Marginson, 2007; Marginson & Considine, 2000). Higher education institutions have significant opportunities to apply KM practices to support every part of their mission (Kidwell, 2001). These imperatives result in the reality of multiple campuses, course teams and forced collaboration to meet KM performance goals. Also, "whilst there is a high level of awareness of the importance of KM in universities, there is a low level of KM implementation" (Oliver, 2003, p. 143).

It is also recognised that effective collaborative research teams are a necessary and desirable component of most scientific endeavours, as their research outcomes reach far

beyond what could be accomplished by individuals working independently (Cheruvelil et al., 2014). In the context of this study, it is crucial to appreciate that the main aim of the education research team members was managing individual and team knowledge to move from the existing funds of knowledge towards the construction of new learned (researched) knowledge.

Thus, the KM context dimension was framed by the combination of the contemporary university culture and changing work. Bringing KM, technologies and capital together is an exciting challenge facing leaders seeking to create an information age higher learning institution (Kok, 2007). Consequently, higher education institutions have significant opportunities to apply KM to support every part of their mission (Kidwell, Vander Linde, & Johnson, 2000). Higher learning institutions should emphasise trust, rewards and a culture of sharing and open communication to encourage KM (Tan & Noor, 2013). Appreciating this contemporary context of higher education culture and academic work is necessary to understanding the KM context dimension influencing this particular case study of an academic research team at a regional Australian university. It was within this university organisational context that my study site was situated, and the concepts of the changing KM culture and work of a research team are explored in my study data analysis. The challenge of educating new generations has existed throughout the history of humankind and has particular currency in the contemporary university context. In this way, the aim of an academic research team is to construct and share research knowledge (Strnadová, Cumming, Knox, & Parmenter, 2014).

In the contemporary university, new KM technology dimension tools have influenced the KM process dimension, and the human dimension has had to adapt to those changes. Change is a fact of life in contemporary business environments, where knowledge is

increasing at a faster pace than ever and keeping up-to-date is a daunting task (Quinn, 2005). Improving the integration and balance between people and technology will enable educators to increase their KM maturity (Turner & Minonne, 2010). The particular KM strategy thus has influences on the process, human and technology dimensions of KM, and so KM strategy is an important influence within the context dimension.

Various KM strategies have been recognised in organisations (Denford & Chan, 2011; Hansen et al., 1999). The codification practice strategy (documenting the knowledge detail for reuse) and the personalisation strategy (the personal communication of knowledge) are both evident (Hansen et al., 1999), with codification producing more explicit, documented knowledge for organisational application, whilst personalisation results in individuals developing more tacit knowledge for application within individual or team projects. There have been suggestions that the personal knowledge strategy must be driven by the organisation's strategy; otherwise the wrong KM strategy may be chosen (Hansen et al., 1999). The study by Hansen et al. (1999) also suggested that the best results came from an 80% focus on one strategy, whether it be personalisation or codification. Furthermore, the knowledge practices at the strategic and operational levels must also be considered (Denford & Chan, 2011). However, what these studies neglected to explore is how the individual personality preferences within the human dimension influence the KM strategies, and how that human dimension permeates across the individual-team-organisation context layers.

The KM strategy of an individual can relate to the team and organisational KM strategy. It has been recognised that there is some alignment between the human dimension (of personality) and the individual's work (Myers et al., 2003). That is, when an individual's personal preferences and practices clash with the situational requirements, it is

recommended that the individual seeks other, more suitable environments (McGuiness, 2013). An alternative view is that the organisation should employ only suitable personalities though selective recruiting (Hansen et al., 1999). Either way, alignment between an individual's personality preference (human dimension) and the KM work strategy (context dimension) is recommended, and this context–human dimension alignment is explored in this case study. Finally, in any KM situation, the existence of both tacit and explicit knowledge must be acknowledged if the context is to be understood.

2.8.2 Space: The Education Research Team Context

The context of the education research team that is the subject of this case study is situated within that "bigger place" of the contemporary Australian regional university as discussed above. In terms of the "smaller space" of the research team, there were many context subdimensions that could have been considered, however only four team subdimensions are considered in this study.

Firstly, the C-Z framework is considered, in order to show how the team "space" fits into the broader university "place". Next a background on team development lifecycles is considered to contextualise the maturity of the team. A brief overview of tacit-explicit knowledge is presented, followed by an introduction to competitive advantage and forms of capital, which are explored further in Chapter 3. With these subdimensions in mind, the context of the team can be analysed for the purposes of this study.

2.8.2.1 The C-Z Framework

One technique to further appreciate the context layers of the individual-team-university is through application of the Crossan-Zietsma (C-Z) framework (Zietsma, Winn, Branzei, & Vertinsky, 2002). The C-Z framework considers the complex interrelationship

between how individuals achieve organisational knowledge and learning across the organisational levels (Zietsma, Winn, Branzei, & Vertinsky, 2002).

Originally, the framework was developed to present organisational learning as processes linking the individual, group and organisational levels (Crossan, Lane, & White, 1999), as is depicted in Figure 2.4. Further developments found that all three levels (individual, group and organisation) are critical to overall firm performance (Bontis, Crossan, & Hulland, 2002).

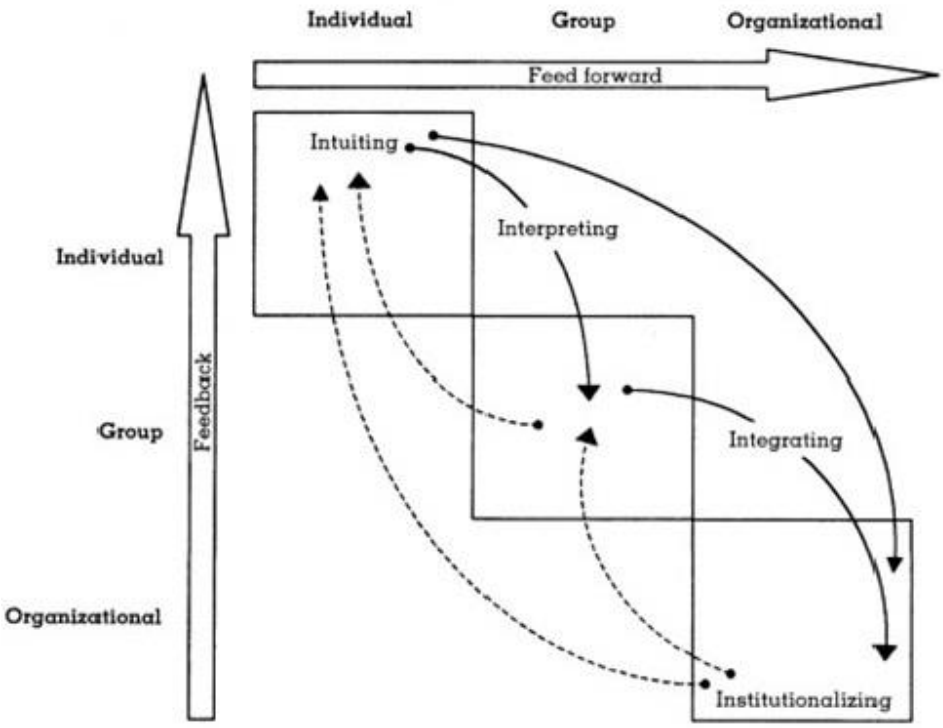

Figure 2.4 Organisational Learning Framework (Crossan, Lane, & White, 1999)

This original framework was subsequently adapted to include the experimenting and attending processes (Zietsma et al., 2002), which are hereby referred to as the C-Z framework in the remainder of this thesis, and as is depicted in Figure 2.5. The C-Z

framework shows the relationship among six learning processes across the three organisational levels of individual, group and organisation (Hislop, 2005). The C-Z framework identifies three levels of learning within organisations and recognises the interactions among them, with intuiting, attending and interpreting at an individual level, interpreting, experimenting and integrating at the group level, and integrating and institutionalising at the organisational level (Ingley & Wu, 2007; Zietsma et al., 2002).

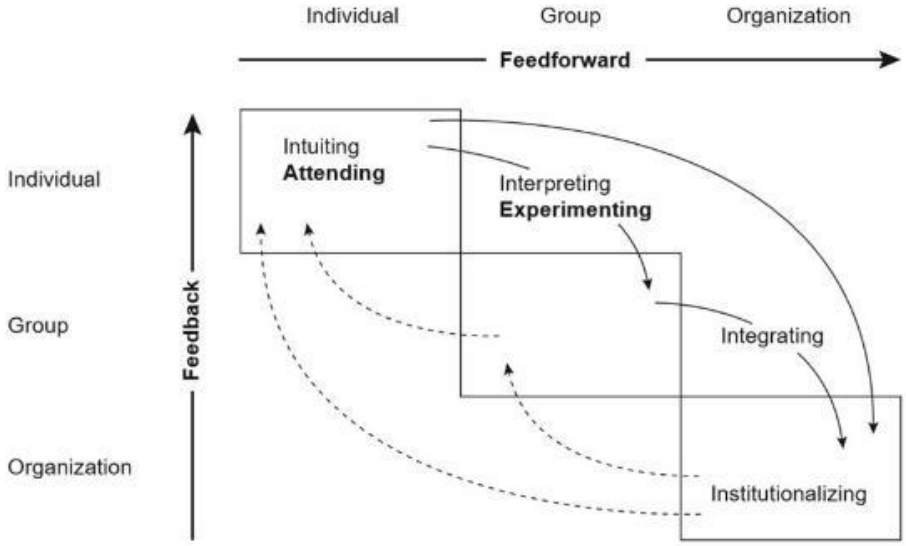

Figure 2.5 The C-Z Framework (Zietsma et al., 2002)

There are also two categories of KM learning flows within the C-Z framework. The feed-forward learning flows refer to newly introduced knowledge where behaviours shift across levels from the individual to the group and then to the organisation, and the feed-back (hyphenated to retain consistency with feed-forward) learning flows refer to existing knowledge and behaviours transferred across levels from the organisation to the group and then to the individual (Crossan et al., 1999). Feed-back learning is as important as feed-forward learning, with both categories being vital for new ideas and knowledge to be

sustained and stored in an organisation (Ingley & Wu, 2007). Thus, the C-Z framework helps to explain the levels existing within the context of my study team – the individual, team and organisation levels. Specific aspects of the C-Z framework such as this feed-back flow and the knowledge levels are further explored and developed within the conceptual framework of this study in Chapter 3.

The literature refers to individual or personal knowledge as personal KM, which represents a bottom-up approach to KM, as opposed to the more traditional top-down approach (Pollard, 2008). Personal KM reflects the view that knowledge workers increasingly need to be responsible for their own growth and learning (Smedley, 2009). I contend that the C-Z framework assists to clarify, appreciate and understand the particular context dimension that may exist within individuals' personal KM interactions among their group (team) and organisation. As discussed in Section 2.8.2, the different KM strategies can link across the context dimension's individual-team-organisation layers, and this linking becomes more apparent through consideration of the C-Z framework. Thus, within the context of this study, the C-Z framework assists in understanding interactions across the various levels, and among the diverse personal KM of the individual team members.

2.8.2.2 Team Development Stages

Within the contemporary reality of a university, the research teams must first form before they can perform. The stage of team life cycle influences team dynamics and productivity (Tuckman and Jensen, 1977). "Future team research has much to gain by investigating how these structural and personal factors are interrelated, rather than which is more important, and to do this, it is essential to study real work teams" (Edmondson, 1999, p. 279). The team life cycle is therefore a particular aspect of the context dimension that is relevant for ongoing research.

For this study, the model selected to describe team development stages was the one first developed by Bruce Tuckman and published in 1965, consisting of the forming, storming, norming and performing (FNSP) stages (Tuckman, 1965). In 1977, a fifth stage, adjourning (A - also referred to as mourning), was added to the model to describe the situation when a team completes a project or disbands (Tuckman & Jensen, 1977). This FNSPA model is depicted in Figure 2.6, and was initially popular among practitioners, and it has now became common in academic literature as well (Bonebright, 2010).

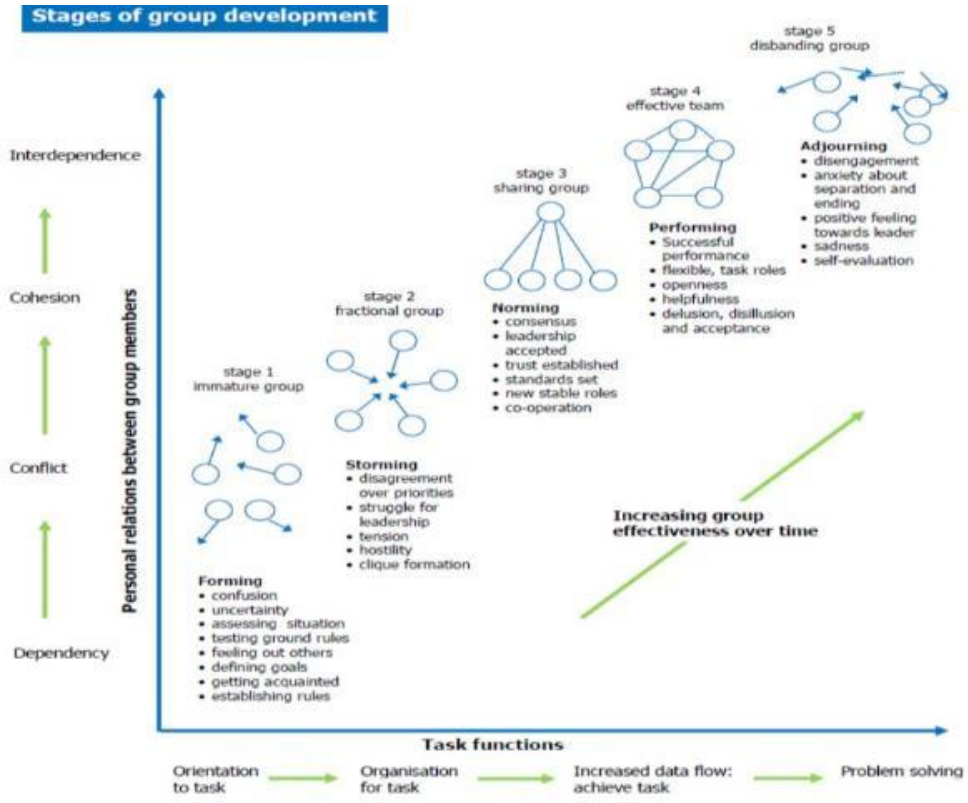

Figure 2.6 The FNSPA Team Development Model (Tuckman & Jensen, 1977)

Many other team development models also exist, such as the seven stage Team Performance Model (Drexler, 1994) with four stages to create the team (corresponding to FSN stages), and three stages to describe increasing levels of sustained performance

(corresponding to PA stages) (Kumar, Deshmukh, & Adhish, 2014). However, in this study, the FSNPA model by Tuckman and Jensen (1977) has been utilised to comprehend the context of a team's development.

My interest in this FNSPA model is that the team matures over time, with each of the team stages being briefly explained within the diagram. Basically, as the team develops and matures, the team processes and interactions tend to improve, and the team performance increases. For example, individuals in a team in the forming stage are often confused and uncertain as to their goals and roles, whilst individuals in a team in the performing stage of the life cycle have the cohesion and interdependence to work as an effective group. It is therefore important to appreciate the stage of development at which the team in my study was functioning, in order to understand the context of their team maturity and life cycle.

2.8.2.3 Tacit and Explicit Knowledge

Both tacit and explicit knowledge must be acknowledged within the KM context, although it can also be considered as part of the process and human dimensions. The role of tacit and explicit knowledge in organisational, team and individual KM strategy is well documented in the KM literature (Alavi & Leidner, 2001; Nonaka & Toyama, 2003). Explicit knowledge is codified (documented) and so can be communicated, both systematically and formally, whereas tacit knowledge exists only within an individual's head and can be shared only tacitly (Alavi & Leidner, 2001). Both tacit and explicit knowledge will exist within a particular context, and so they are addressed as part of the context dimension rather than in the process dimension.

Tacit knowledge is individually possessed, and the goal of any explicit knowledge is that it must end up being tacitly understood (Polanyi, 1958, 1967) That is, for something to

be knowledge it must reside inside the person; otherwise it is just information (Churchman, 1971; Scarbrough, 1999). Tacit knowledge is difficult to make explicit as we know more than we can tell, and therefore we cannot articulate what we know with words because we are not fully conscious of all the knowledge that we possess residing in our human minds (Polanyi, 1962). Polanyi was concerned with individual knowledge, while a different view is relevant to exploring how knowledge circulates in organisations (Bouthillier & Shearer, 2002). Knowledge can be transferred from tacit to explicit in four methods, termed "a spiral of knowledge", which outlines the process for the continual evolution and growth of knowledge (Nonaka & Takeuchi, 1995; Nonaka & Toyama, 2003), these being:

- Tacit to tacit, where one learns knowledge from another, learning by doing. Given that this knowledge continues to reside within the person, its value to an organisation is through employees;
- Explicit to explicit, by combining or adding to existing explicit knowledge to create new explicit knowledge. If no innovation of the knowledge occurs, this is of limited value to the organisation;
- Tacit to explicit, where codification of an individual's tacit knowledge occurs. This method adds to the organisation's knowledge base;
- Explicit to tacit, whereby individuals articulate explicit into tacit knowledge, so that they can then apply, influence, adapt and extend the knowledge, allowing the cycle to continue.

Based on these four spiral processes of knowledge development, individuals, teams and organisations construct their KM (Nonaka & Takeuchi, 1995; Nonaka & Toyama, 2003). However, despite many years of KM research, understanding of tacit and explicit

concepts is relatively low, and typically remains at the individual rather than at the team level (Standing et al., 2016). Thus, both tacit and explicit knowledge was important to consider within the context of my study. This now leads to a consideration of the team development stage, as to how mature the team in my study context was.

2.8.2.4 Competitive Advantage and Capital

In the next chapter, I develop a conceptual framework for KM that considers that the main purpose of KM is to generate a competitive advantage, and that a competitive advantage can result in producing some form of capital. Both of these notions of competitive advantage and capital could be considered as subdimensions of the KM context. It has been suggested that future research might explore the influences of various forms of capital on different power elite coalitions, such as university alumni and professional teams (Spence, Carter, Husillos, & Archel, 2017). In this study, the concepts of competitive advantage and capital are explored in Chapter 3 where I develop an overall KM framework.

2.8.3 Conclusion to the Context Dimension

Appreciating that the particular context dimension is vital to understanding KM. The KM context of this study was influenced firstly by the "bigger place" that was the Australian regional university context, and then by the "smaller space" that the education research team occupied. Several subdimensions of the bigger place and the smaller space have been considered above, and these are used to provide insight into the contextual aspects of the participants during the study data analysis.

Overall, this literature on the context dimension has shown how the bigger place of the Australian university organisation is evolving, with contemporary culture impacting on

the nature of research and funding. Then, focusing in on the smaller space of the actual team, the C-Z framework shows the relationship between the team and the broader university. Also the team development and use of tacit knowledge are considered followed by the introduction of team developments, tacit knowledge and then competitive advantage and capital that are explored in the next chapter.

2.9 The Gap in the KM Literature

My academic evaluation of the literature considers the existing body of knowledge on this KM research topic, and how it has evolved over recent decades. Yet still gaps remain in the KM literature that are ripe for further contemporary research.

Firstly, my literature review highlights the demand for wholistic (Heisig et al., 2016; Tranfield, Denyer, & Smart, 2003), interdisciplinary (Quinn, 2005) approaches to consider a contemporary team's construction of KM. Most studies focus just on one single dimension of KM, rather than contemplating the overall, multiple dimensions of the whole KM topic, and how and why it is important to contemporary work.

This literature review has shown that there is a need to consider all four KM dimensions, the process, human, technology and context dimensions, in an interdisciplinary fashion, as was suggested by Quinn (2005), in order to gain a wholistic comprehension of the overall KM topic.

Therefore, my study addresses the gap in the literature to provide a wholistic, interdisciplinary view of KM, so as to understand better how and why KM functions. In further support that this first research gap exists, it is recognised that further research and development are required in order to converge KM theory (Oliver, 2003). KM research and

literature need further development (Kasvi et al., 2003). The process of knowledge work is difficult to measure, and little consensus has been reached about elements that affect knowledge work productivity on a team level (Bosch-Sijtsema, Ruohomäki, & Vartiainen, 2009). This includes integrating the KM technology dimension more effectively with the human dimension (Denford & Chan, 2011; Department of Defence, 2009; King, 2008; Turner & Minonne, 2010) and considering the group characteristics and team dynamics in relation to KM (Kankanhalli & Tan, 2005).

Further research about the KM relationship with competitive advantage and capital has also been recommended. One study highlighted further research areas broadly related to intellectual capital, knowledge sharing, productivity and competitive advantage (Heisig et al., 2016). It has also been suggested that "future KM research should address the research gap for further empirical investigation on the interplay between KM and innovation (research and development) performance…and also address the contribution of KM to organisational competitiveness" (Heisig et al., 2016, p. 1180).

Specifically, "future studies should use longitudinal approaches, collecting the information concerning the resultant competitiveness after examining the KM exercised in the firm" (Heisig et al., 2016, p. 1184). Also "KM practitioners need meta-analyses research…to help consolidate the available body of knowledge…to better understand where KM enhances the competitive advantage of organisations and where further work is required to fill the gaps in the KM landscape" (Heisig et al., 2016, p. 1188), a view articulated previously (Tranfield et al., 2003).

From these calls, it is evident that the study of the whole "KM elephant", and of the interactions among its KM dimensions, remains in ongoing demand. I provide further advancement of KM theory and practice, with a contribution to knowledge through

continued integration and understanding of the four KM dimensions. I acknowledge that, whilst each KM dimension may be difficult to understand in isolation, it becomes a very complex "elephant' to comprehend when the interactions among the four KM dimensions are considered as a whole. Furthermore, it is important to accept the reality that KM is not a static, stationary thing, it is a dynamic, moving beast, reacting to its evolving process, human, technology and context dimensional environmental changes. My literature review has shaded in aspects to support the existence of the four dimensions to my metaphorical "KM elephant", and to highlight some research gaps to consider further in order to better understand wholistically how and why the participants' constructed KM capacity.

I contend that there is a lack of studies from the broader perspective, to see the KM elephant in all its glory, and that a research gap exists in relation to broadening contemporary understandings of the interrelationships among all four KM dimensions. That then is the first research gap that this study explores; with my RQs seeking to explore the wholistic interactions among all four KM dimensions of my particular KM elephant that is this thesis case study.

Secondly, I point out that it would have been more straight-forward to adopt an existing academic model to frame my comprehension of the four KM dimensions. However, I found no such wholistic model that I desired to adopt, and so I addressed that apparent gap in the literature as another outcome of this research study, by developing an alternative conceptual model to incorporate all four KM dimensions in Chapter 3. It has been noted that there is a significant amount of literature that focuses on "what is" a KM system but sparse literature about what makes up an effective system (Linder, 2014, p. 18), which is indicative of a research gap. There have been attempts to develop a scale to measure KM wholistically at team level, and to provide an empirical integration of a

fractured body of literature about KM (Singh & Gupta, 2014). There have also been theoretical attempts to integrate the literature about KM; however, there has been little empirical work to provide an integrative framework for KM concepts (Singh & Gupta, 2014). To address that gap, in Chapter 3 I pursue the conceptual link among KM, competitive advantage, and the resultant forms of capital that KM can produce. Combining and integrating these four KM capacity dimensions into a wholistic KM framework addresses the gap in knowledge identified above.

Thirdly, I address the gap existing in the context dimension of KM regarding the KM operations in contemporary academic teams. Whilst other teams may have been studied in the past, there remained a gap in contemporary studies specifically focused on academic research teams in an Australian regional university. Therefore the specific context of this study addresses a significant gap in the literature.

I contend that further research is necessary to address the three KM research gaps described above: wholistically exploring all four KM dimensions; exploring a conceptual model to incorporate all four KM dimensions with a conceptual link between KM and capital; and seeking insight into the particular KM context related to contemporary academic research teams. The value and strategic role of further research about this topic are anticipated to have positive effects on academia, education research teams and education research in general. In the next chapter, a conceptual framework is developed to explore these interrelationships among the four KM dimensions to introduce the concept of capital.

2.10 Conclusion

This chapter reviewed the relevant extant literature to identify the gaps in knowledge that this research has been structured to explore. The literature provided considerable evidence to support the existence of four dimensions of KM, these being the process dimension (in Section 2.3), the human dimension (in Section 2.4), the technology dimension (in Section 2.5) and the context dimension (in Section 2.7).

Section 2.8 clarified the research gaps revealed in the literature on which this research focused to explore a wholistic comprehension of the four dimensions of KM in the specific context of an Australian university research team.

This literature review now informs the development of a conceptual framework to bound this study theoretically, addressed in the subsequent Chapter 3, which depicts the KM relationship with competitive advantage and the selected forms of capital.

3. THE CONCEPTUAL FRAMEWORK

3.1 Introduction

The previous Chapter 2 provided a research literature review, discussed the four KM dimensions (process, human, technology, and context), and identified a gap in the literature regarding consideration of all four of these KM dimensions as a whole. Therefore, the knowledge gap addressed by this study is an exploration of a wholistic view of these four KM dimensions within the context of a university research team.

It has been suggested that before any data gathering is undertaken, the development of a theoretical framework is needed (Yin, 1994). Chapter 3 therefore develops an overarching conceptual framework that integrates and connects the extant literature surrounding all four KM dimensions as a unified and combined whole, and then considers the theoretical relationship KM capacity has with forms of economic, cultural and social capital (Bourdieu, 1986). The KM conceptual framework developed in this chapter forms the foundational theoretical structure by which the case study data pertaining to the three RQs are subsequently analysed.

3.2 The Structure of this Chapter

There are eight sections in this Conceptual Framework chapter, with Section 3.2 providing an outline to the chapter structure. The next section (Section 3.3) recaps the four dimensions as presented in Chapter 2 and develops a wholistic KM model. Section 3.4 conceptualises the construction of KM capacity, and Section 3.5 introduces the concept of competitive advantage. Section 3.6 launches into a consideration of the various forms of capital and Section 3.7 brings all the previous concepts together to develop a KM capacity-

capital architecture which forms the conceptual framework for this study. Finally, Section 3.8 concludes the chapter.

3.3 The Wholistic KM Model

In the literature, the four KM dimensions are mostly considered individually, as discrete and separate aspects of KM. However, in reality KM is a wholistic activity, and so each of these four dimensions is an aspect of the whole. Whilst it is acknowledged there may be additional dimensions of KM beyond these four, only these four dimensions have been considered in this study due to scope limitations as discussed in Section 4.7.

The intention of this Section is to develop a wholistic KM model. Understanding the whole is a key to success, as organisations face more dynamic environments, with increasing complexities and relationships, and so each context requires an explicit architecture (Weilkiens, 2016), which in this case is a wholistic KM model. I adopted two guiding principles in my wholistic KM model design.

Firstly, I intended that it be explained in everyday language so as to promote its comprehension (Entwistle, 1991). Secondly, I sought to apply the philosophy of "Occam's razor", to address the complexity of this KM topic. William of Occam (c. 1320) popularised the ancient philosophy that entities should not be multiplied beyond necessity (Tornay, 1938), and so Occam's principle of parsimony is wielded like a razor to cut away superfluous elaborations in the sense that the simplest effective explanation is preferred. This heuristic of parsimony applies in many contexts, including for developing frameworks (Maier & Rechtin, 2002; Weilkiens, 2016).

Thus, the four KM dimensions introduced in Chapter 2 are now developed into a wholistic KM model, as shown in Figure 3.1, which depicts the overarching context dimension being like a "bubble" encapsulating the other three KM dimensions. That is, within this context dimension "bubble", the process, human and technology dimensions interact within the cube at the centre.

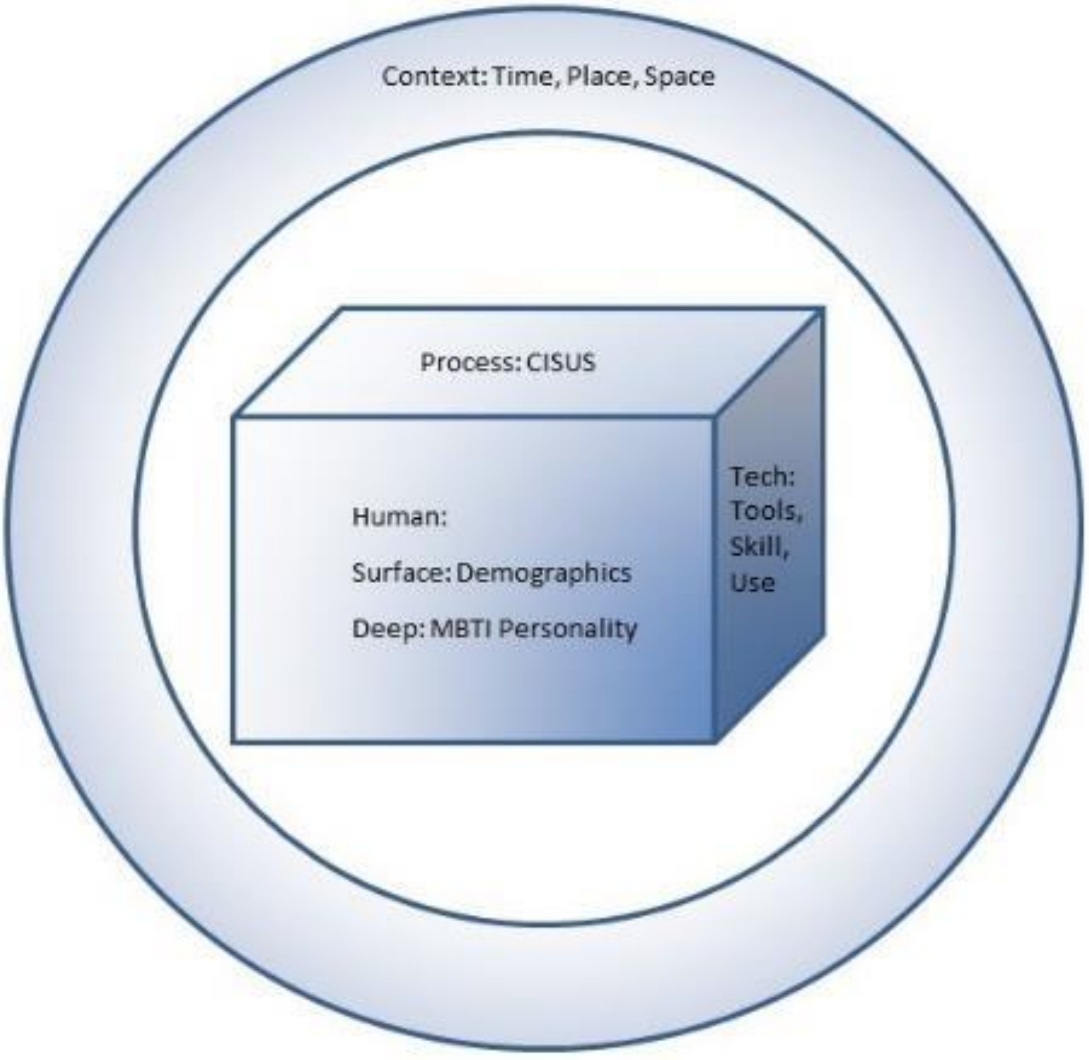

Figure 3.1 The Wholistic KM model (Developed for this study)

To explain Figure 3.1 further, the inner cube contains the process dimension (with its five CISUS[5] subdimensions), the human dimension (with its surface demographics and deeper MBTI personality subdimensions) and the technology dimension (containing ICT skill and use subdimensions). By this model adopting parsimony and everyday language, it thus assists comprehension of the wholistic KM complexity.

Note that there are many additional subdimensions that can be incorporated within that inner cube of the process, human and technology dimensions, as highlighted in the literature review. This study only explores a limited selection of subdimension, to limit the study scope. Notwithstanding, this wholistic model is designed in such a way so that other KM subdimensions can be incorporated within that inner, three-dimensional cube, all contained within the context dimension "bubble".

Previous iterations of this Figure 3.1 model have been presented for peer review (Matthews, 2014, 2015b). My wholistic KM model has been applied in the next sections of this chapter, to conceptualise the construction of KM capacity for the purposes of this study.

3.4 The KM Capacity Construction Concept

Embedded within this wholistic KM model is the concept of capacity-building. Broadly, capacity-building stimulates desired development and change for individuals, teams and organisations (De George-Walker & Tyler, 2014). The notion of capacity-building involves developing the ability to respond to changing circumstances, while

[5] The CISUS processes of create, improve, store, use and share were detailed in Section 2.3.7 of this thesis

continuing to move toward common purposes (Lambert, Collay, Dietz, Kent, & Richert, 1996, p. 145).

KM and capacity-building are posited as complex, interconnected and interdependent (Matthews et al., 2011). Understanding how capacity-building processes work in practice requires an complex array of multidisciplinary analyses underpinned by a solid grounding in personal dynamics, group learning and local contexts (Thomas, 2012).

The concept of capacity-building can be applied to many dimensions and contexts. Capacity-building as an educational concept can be complex, diverse and powerful (Temmerman, 2012). Capacity-building features in a variety of contexts in the literature, including educational research (De George-Walker & Tyler, 2014). Capacity-building has even been considered almost the stuff of myth or magic (Harrow, 2010) owing to its intangibility. As a result, a single encapsulating definition and theory of capacity-building remains elusive (De George-Walker & Tyler, 2014).

Therefore, for the purposes of framing and addressing this study's RQs, I have defined and conceptualised KM capacity-building as the "development of the KM process, human, technology and context dimensions to enhance one's KM capacity". Within the contextual bubble of this study, this means that KM capacity is constituted and constructed by developing each of the KM model dimensions - the process, human and technology dimensions within the context dimension - of a research team. Whilst the tools for building capacity within research teams remain underexplored (De George-Walker & Tyler, 2014), the exploration of RQ2 in this study offers insight into this aspect of capacity construction.

One way to further conceptually explore and provide insight into how and why KM capacity is constructed within research teams is to utilise the C-Z framework that was

introduced in Section 2.7 (Zietsma et al., 2002). In Figure 3.2, I have distilled the original C-Z framework to highlight the concept of *how* the wholistic KM dimensions interact across the knowledge levels (individual-team-organisational), in relation to constructing KM capacity. Thus, Figure 3.2 is hereafter referred to as a KM capacity construction concept.

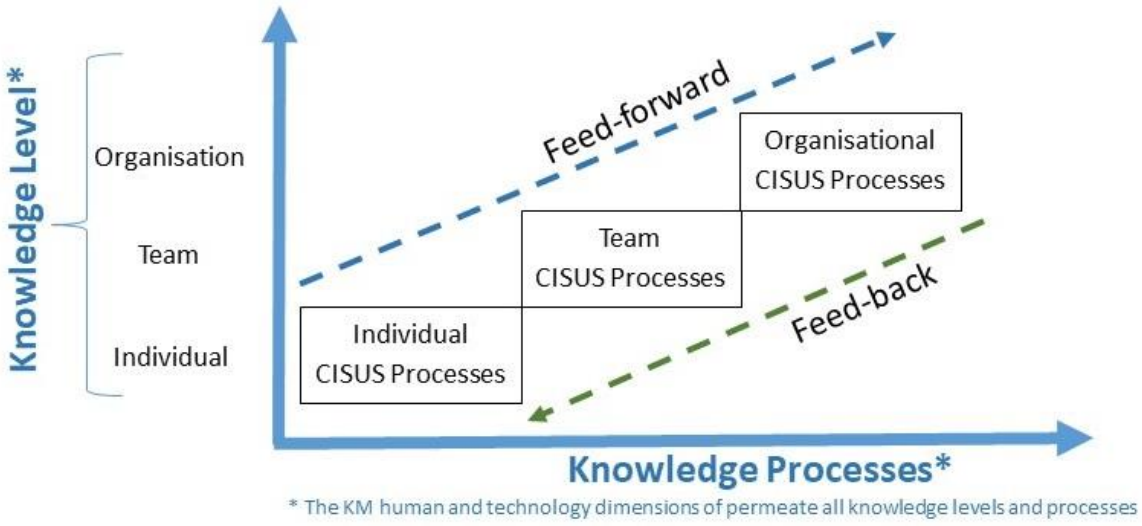

Figure 3.2 The KM Capacity Construction Concept (developed for this study)

The KM capacity construction concept in Figure 3.2 highlights the view that all four KM dimensions can directly develop each individual's wholistic KM capacity. Furthermore, the feed-forward influence of individual KM capacity can influence the organisations KM capacity and vice-versa through the feed-back process. It has been previously realised that the dynamic process interactions among an individual, team and organisation can each influence the others (Ingley & Wu, 2007). This KM capacity construction concept in Figure 3.2 helps to further theoretically explain how the dynamic interaction occurs in constructing KM capacity across the contextual levels.

3.5 Competitive Advantage

Leveraging these four KM dimensions of process, human, technology and context can enable an advantage, and so the concept of competitive (or comparative) advantage is a vital aspect of my KM conceptual framework. It is well recognised that knowledge assets are a source of competitive advantage for contemporary organisations (Davenport & Prusak, 2000; Drucker, 1988, January, 1993; Kakabadse, Kakabadse, & Kouzmin, 2003; Nonaka, 1994). To gain and retain a competitive advantage in the market place, organisations are turning to the practice of KM (Drucker, 1993). Learning organisations use information to create knowledge and to learn, resulting in a competitive advantage that assists their survival (Senge, 1990).

The increasingly fierce competition, the impact of globalisation and the rapid advance of technology are leading to the emergence and development of a knowledge-based economy worldwide (Pearlson & Saunders, 2006; Rollo & Clarke, 2001). Any quest for optimum effectiveness, efficiency and advantage requires a continuous improvement in knowledge, and its wise application (Davenport, 2000). It is the competitive advantage KM brings that is so important to business today (Dalkir, 2005; Davenport & Prusak, 2000). KM is a recognised method of developing competitive advantage through innovation, with innovation implying the creation and improvement of knowledge (Fagerberg, 2005; Huse, Neubaum, & Gabrielsson, 2005).

If organisations manage knowledge to gain competitive advantage (Davenport & Prusak, 2000; Drucker, 1988, January, 1993; Kakabadse et al., 2003; Nonaka, 1994), and if "knowledge can generate competitive advantage in organisations" (Bhatt, 2001, p. 68) then it follows that this competitive advantage must deliver some benefit to the organisation. It has been noted that organisations that have thrived in a global competitive

environment pursued the objective of continuous improvement in their knowledge assets (Senge, 1990). The social processes of acquisition, development and dissemination of knowledge generate competitive advantage and create value for the firm (Longo-Somoza et al., 2015). Likewise, it has been suggested that organisations that improve the knowledge base of their human capital have greater potential to be innovative (Carneiro, 2000; Gloet & Terziovski, 2004). Organisations must work on their knowledge to improve and maintain their competitive advantage, long-term relationships with customers and sustainable profitability and financial services (Farzin, Kahreh, Hesan, & Khalouei, 2014).

Technology dimension advancements have increased global interactions among people (human dimension), and so the importance and value of goods and services produced outside national political geographies have increased, resulting in the concept of international competition becoming increasingly important (Yüksel, 2012). To sustain long-term competitive advantage, organisations must create a KM fit between the technological (technology dimension) and social (human and process dimensions) systems (Bhatt, 2001). By understanding how humans (human dimension) use KM technologies (technology dimension), and by changing the interaction patterns and processes (process dimension) in favour of the users, managers can leverage knowledge for the competitive advantage of the organisation (Bhatt, 2001). Thus, there is clear acknowledgement in the above literature that KM can enable competitive advantage.

Interestingly, in relation to the productive future of knowledge workers, the term "comparative advantage" has also been used. The ability of organisations to survive will increasingly come to depend on their "comparative advantage" in making the knowledge worker more productive, and therefore in the future, leadership in the world economy will have moved to countries and industries that have most systematically and most successfully

raised knowledge worker productivity to deliver this advantage (Drucker, 2012). Given that any advantage is perceived through comparison between two or more entities, the term "comparative advantage" is noted, but "competitive advantage" is my preferred term, as it implies the nature of the various systems not just merely being compared, but actually competing against one another for success.

It must be acknowledged here that, based on some peer feedback on my study, the concept of competitive advantage, or even comparative advantage, seems to be somewhat contentious in the social sciences. The social sciences seem to prefer terms such as "inclusiveness" and "collaboration", and during the course of this PhD study, several academic peers have cautioned me against contemplating the notions of competitive advantage.

Yet, the concept of competitive advantage is quite acceptable in the business discipline where any advantage is embraced and encouraged for organisations to build and sustain leading edge systems, market share and industry leadership. I embrace the term "competitive advantage" and its philosophy, as to me competition is a vital aspect of productivity in the professional world. I therefore agree with the notion that knowledge can generate competitive advantage in organisations, and I argue for its acknowledgment within the social science paradigm, hence its inclusion in this conceptual framework.

It has been predicted that knowledge worker productivity will, within a few decades, bring about fundamental changes in the very structure and nature of the economic system. To that end, to increase their productivity and to convert their increased productivity into performance capacity for the knowledge work organisation, the first requirement is to define what the KM tasks are, so as to enable worker's to concentrate on achieving those tasks (Drucker, 2012). Studies have found that the most effective companies focus on

building staff knowledge, skills and learning in order to build business performance (Benson-Armer et al., 2014). Knowledge workers, however, are their own means of production, with the knowledge between their ears being a totally portable and enormous capital asset. (Drucker 1999, p87). There is an ongoing evolution cycle of knowledge which is living, moving and dynamic, and it has been suggested that knowledge workers will need to acquire new knowledge every four or five years or become obsolete (Drucker, 1992b).

Thus, based on this clear link between KM and competitive advantage, competitive advantage has been incorporated into the conceptual framework to explore the KM relationship for this study. The most measurable aspect of advantage is the outcome of that advantage, which, in a capitalist world, is some form of capital. Therefore, with this study considering the *how and why* of a particular group of knowledge workers and their capacity within the four KM dimensions, competitive advantage enables the construction of some forms of capital.

It can be difficult to define competitive advantage, as what may be perceived as an advantage may, in a competitive market, actually be a disadvantage. However, it is logical that if KM can deliver some competitive advantage (as the above literature supports), then that advantage could also deliver some form of capital at the level of the individual, team and organisation. Thus, I now proceed to explore the relationship between KM, competitive advantage and capital.

3.6 The KM Capacity-Capital Relationship

The wholistic KM model and KM capacity concept were considered in the sections above and this chapter now continues to consider the connections and relationship between KM capacity and the selected forms of capital. To do this, an existing model has been

adapted to reflect the relationship between KM capacity, competitive advantage and selected forms of capital.

Prior to discussing that though, at this point, I feel I must acknowledge that "capital" has a "bad" name. For example, capitalism has been blamed for the pillaging of the Earth (Blasdel & Morton, 2017), contributing to the alleged Anthropocene era (Crutzen, 2002; Steffen, Grinevald, Crutzen, & McNeill, 2011) and raising the risk of a sixth mass extinction event (Barnosky et al., 2011; McCallum, 2015). Thus, by linking to the forms of capital in this thesis, I risk being maligned as a capitalist. However, as I contend in this Chapter 3, it is incorrect to think of capital in just an economic, monetary sense, and ignore the many other forms of capital that exist. I highlight here that I am pursuing a more wholistic view of the forms of capital, and some of these views are now presented to clarify this philosophy.

3.6.1 The Van Winkelen and McKenzie (VW-M) Model (2011)

One potential relationship between KM capacity and the selected forms of capital was identified in the literature review by the suggesting that forms of capital could be generated through increasing knowledge flows, in the sense that intellectual capital can be generated through increasing knowledge flows to build learning capacity (Van Winkelen & McKenzie, 2011). Put simply, it is recognised that KM can generate forms of capital. This potential relationship between KM and the different forms of capital is shown diagrammatically, as presented in Figure 3.3 (Van Winkelen & McKenzie, 2011). For ease of future reference in this thesis, I shall now refer to this as the "VW-M model" to denote the work of Van Winkelen and McKenzie (2011).

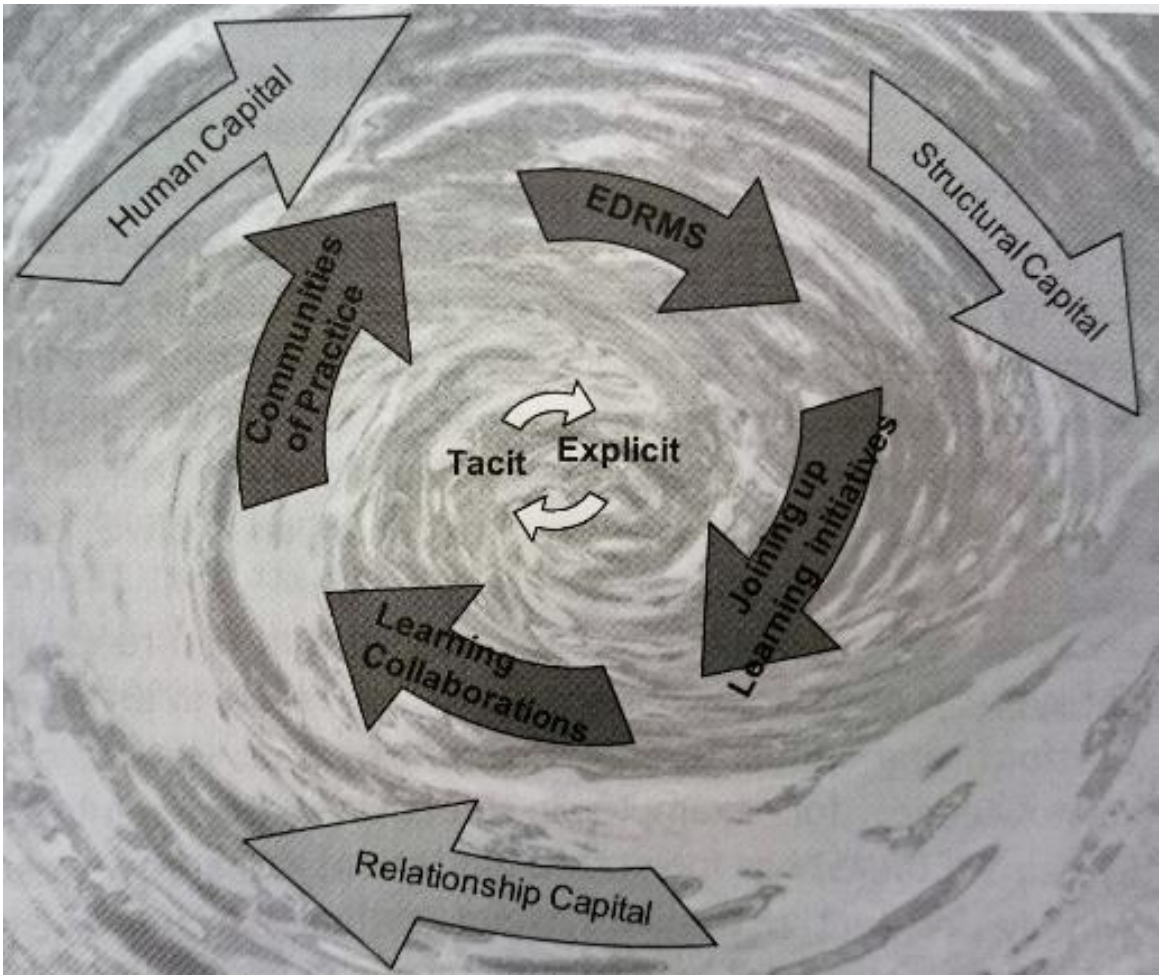

Figure 3.3 The Van Winkelen-McKenzie Model (2011)

As illustrated in Figure 3.3, Van Winkelen and McKenzie's (2011) model suggests a KM-capital relationship, in that four KM approaches to building learning capacity (learning collaborations, joining initiatives, communities of practice and document management) generate value in an organisation by developing human, structural (also called organisational), and relationship capital through increasing knowledge flows. Thus Figure 3.3 reveals a relationship between the various dimensions of KM and the different forms of capital (Van Winkelen & McKenzie, 2011). However, the VW-M model seems to focus more on the process dimension, particularly the sharing (learning collaborations,

Communities of Practice (CoPs), and storage (EDRMS being an electronic document and records management system) subdimensions, and does not seem to adequately address the context, technology or human dimensions. Also the VW-M model only considers particular forms of human, structural and relationship capital.

Importantly however, the VW-M model highlighted to me the link between KM and the different forms of capital, which could help to explain *why* constructing KM capacity is so important – to build capital. Therefore, I sought to further explore this KM-capital relationship through this study's theoretical and empirical means, in order to better understand and depict this relationship between KM and the forms of capital.

3.6.2 Adapting the VW-M Model for this Study

My first improvement to the VW-M model framework in Figure 3.3 was to include the four dimensions of the wholistic KM model as elaborated in Section 3.3 of this chapter. That is, I substituted the context, human, technology and process dimensions of KM from Figure 3.1 into the core of the VW-M model. By doing this, I upgraded the VW-M model into a broader, more wholistic model of the KM dimensions. In this way, the model accounts for all four KM dimensions and thus was more suitable to use as a conceptual framework for this study.

Secondly, I incorporated the notion of competitive advantage as mentioned in Section 3.5 of this chapter. The literature has long recognised the link between KM and competitive advantage (Davenport & Prusak, 2000; Drucker, 1988, 1993; Kakabadse, Kakabadse, & Kouzmin, 2003; Nonaka, 1994). It has also been shown that competitive advantage can lead to some forms of capital (Gloet & Terziovski, 2004; Hermans & Kauranen, 2005; Subramaniam & Youndt, 2005) and vice-versa (Luthans, Youssef, & Avolio, 2007).

Thirdly, I modified the VW-M model to incorporate Bourdieu's (1986) forms of capital. The rationale for incorporating Bourdieu's (1986) forms of capital into the VW-M model for the purposes of this study is explained and justified in the next section. Following that incorporation of Bourdieu's (1986) forms of capital, the revised model will be presented and discussed in Figure 3.5.

Various different forms of capital were considered before selecting Bourdieu's (1986) forms. Recent research has concluded that some KM experts advocate more research into understanding the link between KM and the different forms of capital (Heisig et al., 2016). For example, further study on KM-capital integration is required in different contexts (Widén-Wulff et al., 2008). Previous studies have revealed that various forms of capital are significantly related to organisational performance (Bontis, 1998; Bontis, Keow, & Richardson, 2000). It is also considered that further integrating these different forms of capital could enable a better understanding of the complex and multidimensional reality of knowledge processes in the organisation (Heisig et al., 2016).

In the past two or three decades, scholars have developed different definitions on the different forms of capital. Some forms of capital identified in the academic literature include environmental/ecological capital (Moore, 2003; Newell, 2011), sustainability capital (Elkington, 1998), educational capital (Friedman & Krackhardt, 1997), human capital (Coleman, 1988; Gauntlett, 2011; Hartog, 2007), physical capital (Coleman, 1988; Gauntlett, 2011), emotional and relationship capital (Geist & Ruppanner, 2018), racial capital (Pulido, 2017) and of course intellectual capital (Bueno, 2012; Bueno, Salmador, & Longo-Somoza, 2014; Edvinsson & Malone, 1997; Masa'deh, Shannak, Maqableh, & Tarhini, 2017; Seleim & Khalil, 2011). Aspects of the KM capacity – capital relationship have previously been studied, however, many of these utilise intellectual capital (Bueno,

2012), rather than Bourdieu's forms of capital. This study focusses only on the three forms of capital identified by Bourdieu (1986): economic, cultural and social.

3.6.3 Bourdieu's (1986) Forms of Capital

The French sociologist Pierre Bourdieu (1930-2002) originally presented the three forms of economic, cultural and social capital (1973, 1980, 1984, 1986). It is difficult to do justice to Bourdieu's complex theories in just a section of a thesis; however, I have highlighted only his key points about capital (for other aspects refer to Section 9.5) that I deem most relevant to this study. It has been noted that Bourdieu's ideas offer a toolbox, a range of concepts which can be deployed to illuminate a wide range of issues, with great explanatory power, especially if supplemented by other ideas (Grenfell & Kelly, 2003). In that sense, I consider Bourdieu's concepts of capital in relation to my KM capacity ideas. An individual's overall capital is constructed from their combined cultural, economic and social capital (Bourdieu & Wacquant, 1992).

Various academic have since analysed (Robbins, 2000) and extended (Coleman, 1988; Putnam, 2000) Bourdieu's ideas. Some criticisms of Bourdieu's work can be categorised as the imprecise definition of his concepts, the lack of cross-cultural transfer for his concepts, the delay from his research to publication, his attitude to the working class, and the inability of his theories to account for change (Robbins, 2000). I acknowledge these criticisms but consider that Bourdieu's three forms of capital provide an insightful and elegant academic framework to apply within my study on KM, as explained further below.

3.6.3.1 Economic Capital

Economic capital is derived by owning assets that have financial worth. A simplistic view is that "economic capital is in people's bank accounts" (Portes, 1998, p.7). Economic

capital is related to financial resources, and the consumption of goods and materials of scarcity and luxury, organised around exchange value (Holt, 1988).

Perceptions of economic capital have evolved, and become more sophisticated over time, to consider supply, demand and divisions of labour (Smith, 1776) followed by the concepts of commodity use-value, exchange-value, and capital control (Marx, 1873). Ideas related to capital (saving and investing) were then explored by others such as Keynes (1936). French economist Thomas Piketty's book on contemporary capitalism, *Capital in the Twenty-First Century*, discussed economics, social policy and politics, and made the contention that capitalism increased inequality and that as a result societies became not just more divided, but also less efficient Piketty (2014). Whist this view is debatable, he does make the point that the relationship with various forms of capital is complex.

The quest for understanding and managing economic capital continues around the world today. The concepts of economic capital seem to be commonly understood in the western world context of my study. Bourdieu (1986) subsequently linked economic capital with social and cultural capital in ways that have since been further supported (Coleman, 1988; Putnam, 2000), highlighting my contention that all three forms of capital must be included in explorations of the KM capacity-capital relationship, as discussed below.

3.6.3.2 Cultural Capital

Cultural capital consists of a set of socially rare and distinctive tastes, skills, knowledge, and practices (Holt, 1988) and can be simply defined as how you spend your free time (Carey, 2018), with some activities generating more cultural capital and societal status than others. Cultural capital does not possess absolute value which is quantifiable,

but only possesses value in exchange, and the exchange is a social struggle as much as a struggle of cultural value judgement (Robbins, 2005).

According to Bourdieu (1984, 1986), cultural capital appears in three states: embodied, institutionalised and objectified, which can each convert back into other forms of capital (economic and social). Embodied (or incorporated) cultural capital includes bodily comportment and speaking as markers of distinction (Erel, 2010) as well as implicit practical knowledges, skills and dispositions (Holt 1988). Institutionalised states includes formal education (Erel, 2010), certified in official degrees and diplomas (Holt, 1988) as well as informal education (from family and cultural groups) (Erel, 2010). The objectified state of cultural capital can be held in cultural objects (Holt, 1988) such as books, art, clothes, tools and instruments (Erel, 2010). Bourdieu (1984) explored the ways in which material objects are used by people as signifiers, as they seek to identify themselves with those above them on the social ladder, and to demonstrate their difference from those below, and so inflate their forms of capital (Bourdieu, 1984).

Bourdieu's (1984) views on how material objects influence the dynamics of social class relations were ground breaking (Gauntlett, 2011) and involve social relationships or networks that provide access to resources and must be actively maintained to gain socially desirable ends (Lareau, 2001). This reveals the close relationship between Bourdieu's (1986) three forms of capital, as with more economic capital, one can purchase greater objectified cultural capital, which in turn improves one's social capital. However, now that technology enables rapid diffusion and cheap access to such objects across society it is becoming increasingly difficult to infer status directly from objects (Holt, 1988).

These various cultural capital states are a key element to generating the social psychological structure that Bourdieu referred to as habitus (1984, 1986), in that one

signifies one's status by expressing one's tastes (Holt, 1988). Another form of cultural capital may extend to the genetic markers that we all possess within our unique individual DNA, as inherited our ancestors (Budowle & van Daal, 2009). However, in this study context of academic research teams, the institutionalised cultural capital is probably most relevant. This is because the recognition that elite university credentials are forms of cultural capital that are privileged by recruiters (Cook, Faulconbridge, & Muzio, 2012) and that cultural capital forms key markers in the composition of expert elites (Spence et al., 2017). That said, all three states of cultural capital will be considered in Chapter 8's analysis of RQ3.

3.6.3.3 Social Capital

The term "social capital" is often credited to Pierre Bourdieu (1980), although Glenn Loury referred to it earlier (1977). However, it was Robert Putnam who popularised the term (Putnam 1993), and it has gained recent popularity in a variety of academic disciplines (Lee, Árnason, Nightingale, & Shucksmith, 2005) and publications (Burt, 2000). Social capital, according Bourdieu (1986), consists of the social network and status within that network as forming a certain capital relative between individuals. There is broad agreement that social capital is a resource based on relationships among people, organisational affiliations and networks (Holt, 1988). Social capital is related to the structure of human dimension relationships (Portes, 1998).

Social capital can be divided into two groups, collective and individual (Kilpatrick, Field, & Falk, 2003). There are other potential forms of social capital, such as instrumental and consummatory social capital (Willem & Scarbrough, 2006); however, only the collective and individual types were explored within the scope of this study. The collective view is that networks and norms apply for collective benefit (Putnam, 1993, 2000), defining

social capital as "features of social organization, such as networks, norms, and trust, that facilitate coordination and cooperation for mutual benefit" (Putnam, 1993, p. 35). The group who argue that social capital is individual includes Loury (1977), Bourdieu (1986) and Coleman (1988), contending that the benefits accrue to the individual (Coleman, 1988; Coleman, 1990), and are realised by individuals (DeFilippis, 2001) in social relationships.

Other views are that social capital is relationship based, whereby all participants in a team provide their invaluable resources via their relationships that they develop and maintain (Inkpen & Tsang, 2005). Social capital can also be defined as consisting of social structure, and as facilitating certain actions of actors (persons, teams or corporations) within that social structure (Coleman, 1990). Social capacities such as one's charm, charisma, and chemistry build the social networks of "who you know", and in turn one's social capital within one's community and perhaps relate to notions of embodied cultural capital. "The notions of social capital provide fundamental insights into knowledge management" (Jashapara, 2005, p. 136), as will be discussed below.

Bourdieu uses the terms habitus and field to describe the fit between an individual and their broader society. "Habitus" is one's disposition that results from social training and past experience (Reed-Danahay, 2005), which enables us to perceive, think and act in a certain way (Grenfell & James, 1998). The "field" relates to the structured system of social relations at a micro and macro level, and when an individual's habitus is consistent with the field in which he or she is operating, that is, when the field is familiar to and understood by the individual, he or she enjoys a social advantage (Grenfell & James, 1998). In the context and field of an academic research team the term "God Professor" (Schouten, 2005) denotes an alpha individual with significant social capital derived from their intellectual and knowledge habitus performance. This implies that in the context of a research team, knowledge leadership can enable social capital. Furthermore, it has been

shown that in academic teams, team structure and trust can improve knowledge sharing and social capital (García-Sánchez et al., 2017) but further study on this KM-capital integration is required in different contexts (Widén-Wulff et al., 2008).

Social capital can also help to explain the situation when a worker, working within a group, suddenly gains access to the broader knowledge network of that group despite that worker not yet having individually contributed much to developing those relationships (Kostova & Roth, 2003). Thus, social capital can be gained through membership to particular social groups.

Social capital has already been linked directly with knowledge and learning. The model in Figure 3.4 reveals what resources people drew on for their social capital interactions in a particular context (Falk & Kilpatrick, 2000).

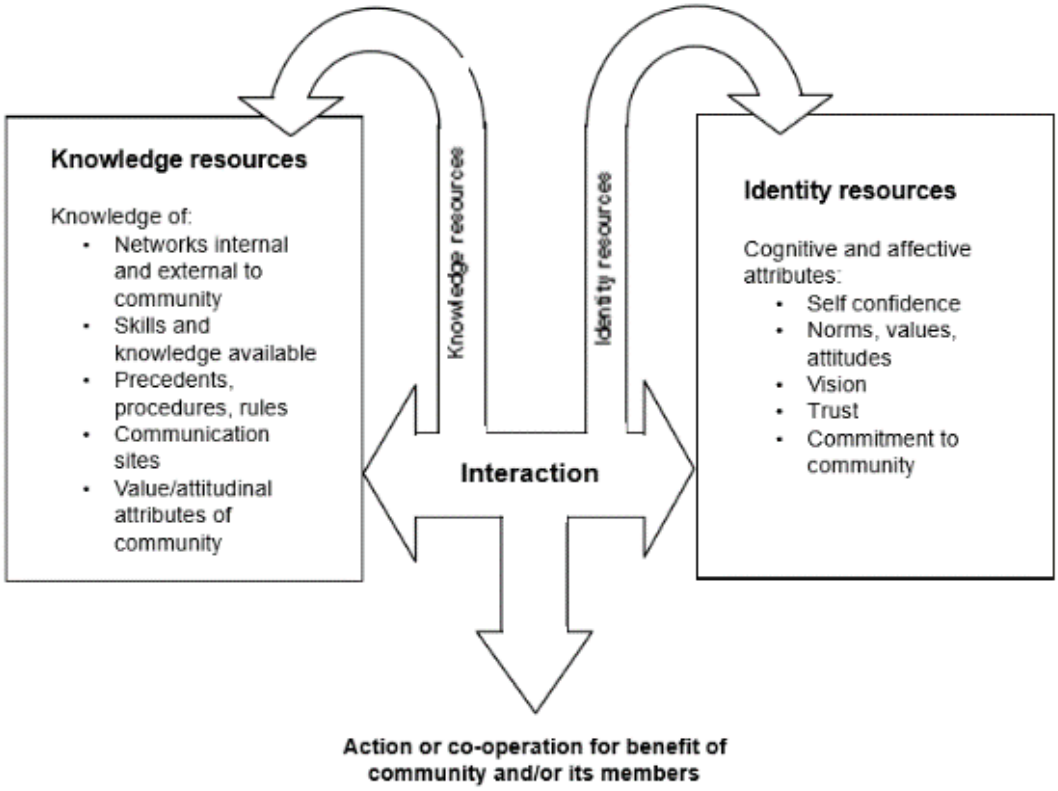

Figure 3.4 Simultaneous Building and Using of Social Capital (Falk & Kilpatrick, 2000, p. 33)

Figure 3.4 supports my concept that the interaction (via the KM process dimension) of the resources (human, technology and context dimensions) has a relationship with social capital benefits (forms of capital). Thus, Figure 3.4 provides a good foundation to explain the how-why relationship between KM and capital. It also suggests a link between social capital and cultural capital through KM language, in the sense that a 'new' member of a group appropriates the specialist cultural language resources and markers of the subject domain in order to gain full (and credible) identity, interaction and social capital acceptance within the group and community. To that end, Figure 3.4 could be expanded to consider not just the relationship between KM and social capital, but also the forms of economic and cultural capital (Bourdieu, 1986).

3.6.4 Conclusion to Forms of Capital

Bourdieu's forms of capital (1986) have been outlined above and accordingly, Bourdieu's original three forms of capital appear a reasonable conceptual framework for contemplating capital. Therefore, despite the complex debate surrounding the various forms of capital, this study has utilised Bourdieu's forms of capital as a basis for developing my KM capacity-capital architecture below. Whilst social capital has been linked with economic capital (Widén-Wulff & Ginman, 2004), most studies seem to focus on just one form of capital, such as social capital (Coleman, 1988, 1990; Putnam, 1993, 2000).

Thus, I have drawn a similar conclusion as in my literature review; namely that whilst it is good to debate the details within each form of capital, it is the overall, wholistic, combination of all three forms of capital working together that helps explain how and why a research team constructs KM capacity. Consequently, my study seeks to explore this wholistic relationship among all four KM dimensions, and all three of Bourdieu's (1986)

forms of capital, and therefore it became apparent that I needed to develop my own broader conceptual framework to achieve this.

3.6.5 Adapting the VW-M Model to Incorporate Bourdieu's (1986) Forms of Capital

The original VW-M framework referred to human, structural and relational forms of capital, which are forms of intellectual capital (Bueno, 2012). I acknowledge the VW-M model incorporation of these forms of capital, however in the above section, I have outlined Bourdieu's (1986) forms of capital which offer an alternative conceptual view on the KM-capital relationship.

Therefore, despite the complex debate surrounding the various forms of capital, as was outlined in the previous section, this study adopted Bourdieu's (1986) forms of capital as the basis for my KM capacity-capital architecture that is shown in Figure 3.5. Bourdieu's (1986) forms of capital offer an academically robust and rigorous view on the relationship between KM and capital for the purposes of this study. Consequently, only Bourdieu's three forms of capital - economic, cultural and social - are utilised in this study, as explored within RQ3 in Chapter 8. I thus adapted the VW-M model still further by substituting Bourdieu's forms of capital into the outer circle of the original VW-M model.

3.7 My KM Capacity-Capital Architecture

Others have concluded that the formation of a network of academics and practitioners who understand and support intellectual capital may be the first step toward survival in a new business environment, one ruled by intellectual capital (Bontis, 2002). I support this notion based on the suggested relationship between KM and capital. However, Bourdieu's

(1986) forms of capital offer an alternate view to intellectual capital (Bueno, 2012), as discussed above.

Therefore, I have subsequently extended my conceptual framework based on a combination of the three VW-M framework developments discussed above, to reflect the conceptual relationship (Entwistle, 2000) among the four dimensions of KM capacity, competitive advantage and Bourdieu's forms of capital. This is now a substantial extension of the VW-M framework, which I shall hereafter call the KM capacity-capital architecture, which is presented in Figure 3.5.

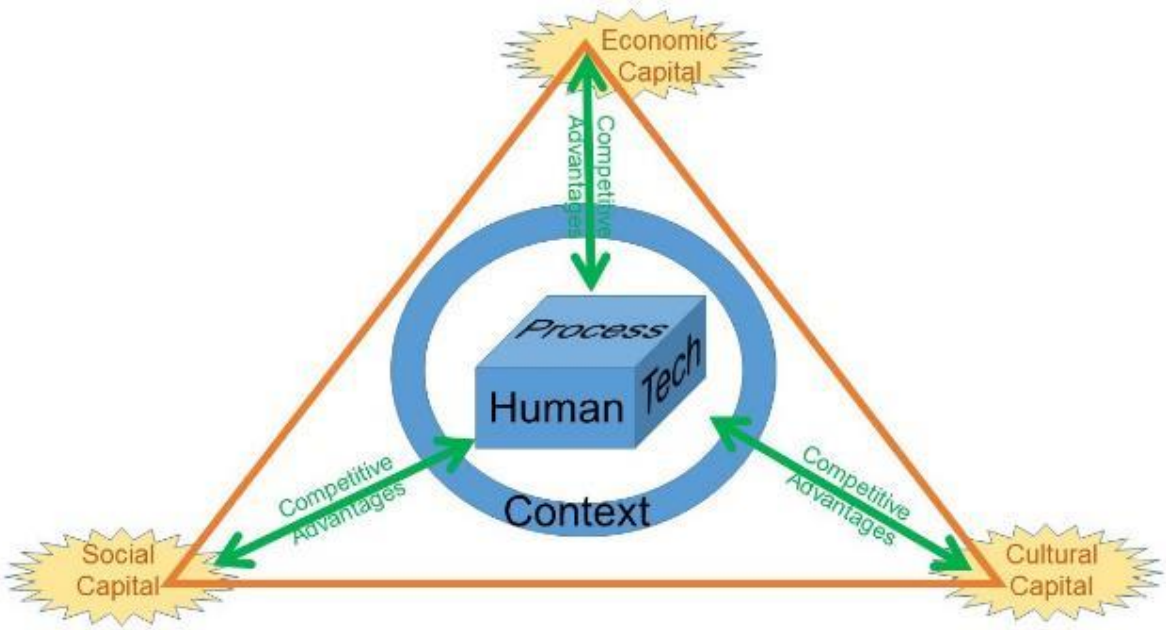

Figure 3.5 The KM Capacity–Capital Architecture (Matthews, 2015b)

This KM capacity-capital architecture shown in Figure 3.5, as developed by this research, shows the complex and crucial interrelationships among KM capacity, competitive advantage and the selected forms of capital.

The inner part of Figure 3.5 depicts the wholistic KM model as was shown in Figure 3.1, with its dimensions of process, human and technology, surrounded by a context dimension "bubble". The KM capacity constructed within this inner part enables a competitive advantage as was discussed in Section 3.5. This in turn facilitates the construction of economic, cultural and social capital as was discussed in Section 3.6. Conversely, the different forms of capital can fund a competitive advantage that can further build the KM capacity. I have termed this an architecture, rather than a model or framework, as it depicts the design by which KM capacity-capital is constructed.

Previous iterations of my KM capacity-capital architecture have been formally presented during the course of my PhD candidature (Matthews, 2014, 2015a, 2015b). It has received positive peer reviews, and as such, my KM-capacity-capital architecture at Figure 3.5 (and its associated explanations) forms a theoretical contribution to knowledge on this topic, and provides the conceptual framework underpinning this study research design and method and is utilised to analyse the data in response to the RQs1, 2 and 3 in Chapters 6, 7 and 8 respectively.

3.8 Conclusion

Chapter 3 has integrated all four KM dimensions together into one wholistic model as shown at Figure 3.1, and then proceeded to conceptualise the KM capacity construction concept, resulting in Figure 3.2. Consideration of competitive advantage and Bourdieu's (1986) forms of capital has enabled my adaption of the VW-M (2011) model. Based on this background, I proposed my own KM capacity-capital architecture in Figure 3.5, which forms the conceptual framework for this study. I now move on to Chapter 4 to consider the research design that this study has deployed.

4. THE RESEARCH DESIGN

4.1 Introduction

Chapter 2 reviewed relevant literature to identify a gap in the body of knowledge related to my research, and Chapter 3 developed the conceptual framework for this study to integrate the process, human, technology and context dimensions of KM with Bourdieu's (1986) forms of capital. This chapter aligns with, and adds value to, the preceding chapters by presenting and justifying a research design, based on a qualitative, single site case study, that is consistent with the conceptual framework (the KM capacity-capital architecture) as presented in Chapter 3 and that provides a rigorous, credible and ethical means of addressing the three RQs.

4.2 The Structure of this Chapter

The structure of this chapter first defines the study's research design philosophy, which includes a description of the study orientation, assumptions and paradigm (Section 4.3). The rationale for an exploratory, ethnographic, case study approach is presented in Section 4.4, detailing the process to select the study site and participants. This is followed by considerations of the study's ethics, risks and politics in Section 4.5, with Section 4.6 and 4.7 providing an explanation of how my dual role and research limitations were respectively managed. The strengths and rigour of this study are addressed in Section 4.8, followed by the conclusion (Section 4.9).

4.3 The Research Design Philosophy

This study was designed to address my three RQs, and the following subsections detail my research design philosophy, including my research orientation, philosophical assumptions and paradigm respectively.

4.3.1 The Qualitative Research Orientation

It is recognised that there are three social research orientations; quantitative, qualitative and mixed methods (Denscombe, 2008; Silverman, 2015). A focus on a qualitative research design was considered appropriate for my study, for several reasons discussed below.

The main reason for adopting a qualitative orientation to this study was to explore wholistically what, how and why a research team constructed their KM capacity-capital relationship. To answer these how and why questions, it is usually essential to collect qualitative data (Somekh et al., 2011). Qualitative research enables interpretation of the what and how RQs, which in turn lays the groundwork for the why questions (Gubrium & Holstein, 1997). Answering the what and how questions precedes answering the why questions (Silverman, 2005). Importantly, this what-how-why sequence of qualitative research forms the theoretical reasoning that underpinned development of the *what, how and why* RQs explored in this study, as presented in Section 1.5.

Qualitative research emphasises the wholeness of the individual (Denzin & Lincoln, 2011; Stake, 1995), and I found this wholistic aspect appealing as it aligned with the nature of my study. Qualitative research is based on the idea that meaning is constructed by individuals in social interactions with their world (Merriam, 2002, 2009) and, whilst acknowledging that these meanings may vary in different historical, cultural, individual

and political contexts (Denzin & Lincoln, 2011; Hewson & Hughes, 2005), aims to understand the particular research context (Merriam, 1998). Therefore, qualitative research was considered appropriate for exploring wholistic KM capacity in the context of my study.

Qualitatively orientated research involves an "interpretive, naturalistic approach to its subject matter" (Denzin & Lincoln, 1998, p. 3), emphasising the use of inductive strategies of theory development (Patton, 1990). "Qualitative researchers inductively derive findings from study data typically in the form of themes, concepts and even substantive theory" (Merriam, 2002, p. 5). Qualitative research is applied to discover and describe issues in the field, or structures and processes in routines and practices (Flick, 2013). While qualitative research may involve the use of numeric data, it gains its meaning from interpretations of "non-numeric data in the form of words" (Schwandt, 1997, p. 130). My approach thus sought non-numeric data in this case study from emergent, inductive multi-method design.

Another reason for the focus on qualitative research in this study was that it is perceived to be creative and artistic (Denzin & Lincoln, 2005), requiring "imaginative understanding of the studied phenomenon" (Charmaz, 2006, p. 126), whereby interpretations are constructed through engagement with participants (Schwandt, 2000). This artistic and imaginative aspect, combined with the wholistic aspect, appealed to my intuitive, unstructured (INTP) preferences (Myers et al., 2003), as I innately seek to consider the bigger picture, and a contemplation of the overall architecture of a situation.

Thus, a qualitative orientation was considered appropriate for this research project, in order to engage creatively with participants and to address my RQs. Some limitations in adopting a purely qualitative orientation are discussed in Section 4.7, and my associated philosophical assumptions are outlined below.

4.3.2 My Philosophical Assumptions

There are several philosophical assumptions relevant to qualitative research, including ontological and epistemological (Ormston, Spencer, Barnard, & Snape, 2014), as well as axiological, rhetorical and methodological (Guba & Lincoln, 2005) assumptions. All qualitative researchers are philosophers in the sense that they are guided by "beliefs about ontology, epistemology and methodology, and these beliefs shape how the researcher sees the world and acts in it" (Denzin & Lincoln, 2005, p. 22), guiding researcher action in the process (Guba, 1990). It is therefore important for the credibility of this study to make these philosophical assumptions explicit at the outset.

The ontological assumptions refer to the set of shared beliefs about the nature of the (social) world (Denscombe, 2008). Ontological assumptions are concerned with "what is the nature of reality" (Denzin & Lincoln, 2005, p. 22), to know if something is real or not (Mertens, 2007). Ontologically, the study's conceptualisation was based on empiricism and the notion that the researcher can observe the world and evaluate those observations in relation to facts (Matthews, 2012a, p. 205). My ontological stance considered KM as another branch of the metaphysical sciences, with practical implications for designing and conducting this research. There are, as was outlined in Chapter 2, several thousand years of philosophy regarding the ontology of knowledge and its management. Whilst culture and society existed before we had the sciences of anthropology and sociology (Bouthillier & Shearer, 2002), since around the time of Socrates (c470-399BCE), Plato (c428-347BCE) and Aristotle (c384- 301BCE) to the present day, there is a rich history of scientific knowledge development. The practical ontological implication is that the issue of KM is real, and that my qualitative research continues to build on previous KM philosophical developments.

My epistemological assumptions are beliefs about the knowability of the (social) world (Denscombe, 2008), to explore "what is the relationship between the inquirer and the known" (Denzin & Lincoln, 2005, p. 22), and to define the extent to which I can know what exists (Stake, 2005). I adhere to the view that my personal knowledge is limited and finite; however, I am able to acquire new knowledge through research and learning. Examining empirical evidence is a legitimate approach to support the development of new scientific fields, theories and concepts, and is often rooted in practice (Bouthillier & Shearer, 2002).

Therefore, to manage my epistemological biases and to examine empirical evidence, my research aimed to get as close as possible to the participants in this study, by ethnographically entering the field, participating in team operations, and developing experiential knowledge and understanding (Stake, 2005). I got to know more of the field, based on what the participants were doing, saying and thinking, and I explored their motivations and incentives for their actions. My ethnographic intent is bolstered by my biographical research journey as explained in Section 1.7.

Related to this, my rhetorical assumptions are to make my writing personal and literary in form, in the first person, allowing naturalistic generalisations as appropriate to assist readers in drawing on their own experiences and to generalise intuitively their own constructions of knowledge (Guba & Lincoln, 1985; Stake, 2005; Stake, Stark & Torrence, 2005). In this thesis, I endeavoured to use clear descriptions of the contextual setting and the participants to enable readers to draw generalisations and to facilitate the transferability of my findings to other contexts (Guba & Lincoln, 1985).

Another important epistimological assumption is that there are multiple subdimensions of the human being, and as such there are many tools and techniques to explore these subdimensions, as was discussed in Chapter 2. In my 15 years of practising

as a qualified MBTI practitioner, I have observed the influence of personality preferences on individuals' KM capacity. For me, embracing the MBTI techniques to understand the human dimension of KM has significantly influenced my life, as it has allowed me to embrace my own preferred personality perspectives of the world. However, and perhaps more importantly, by accepting my own perspective I have become more appreciative of others' perspectives, as their relational diversity informs me to understand better the broader aspects of an issue.

The axiological assumption is to state the researcher's position, values and subjectivities (Stake, 2005). I was inspired by the view that "qualitative research scholars have an obligation to change the world, to engage in ethical work that makes a positive difference" (Denzin, 2012, p. 86). My axiological assumptions are also located around the premises of KM developments that I have gleaned over the last 20 years as a biographically situated researcher, as was acknowledged in Section 1.7, which firmly position me as a KM advocate.

Methodological assumptions consider "how do we know the world, or gain knowledge of it?" (Denzin & Lincoln, 2005, p. 22). My methodological position has been to embrace emergent design, with the results developing based on experiences from the field. This is in line with my qualitative orientation as was discussed in the previous section, where I utilised inductive strategies (Patton, 1990) to analyse non-numeric data (Schwandt, 1997). Also, as I epistemologically and axiologically value the MBTI instruments' quality for providing insights into the human dimension, the MBTI constitutes a core methodological lens to explore the deeper human dimension profile of participants within this study. The methodology that I deployed for this research is discussed in Section 4.4, in

terms of whether it has supported my methodological assumption that the MBTI instruments can form an important element of the production of strong, rigorous research.

With these philosophical assumptions, I proceeded to approach this study with a qualitative research orientation. I strove to minimise my biases during this study, as I understood the data analysis risks that may have arisen from my philosophical assumptions. In Section 4.7, I detail how I managed my assumptions and biases during the collection, analysis and interpretation of the data, in order to minimise risks and to strengthen this study's credibility. My research paradigm and method were also developed accordingly, as is discussed in the next subsection.

4.3.3 The Social Constructivist Research Paradigm

The research paradigm connotes the "commitments and values" (Schwandt, 1997, p. 109) that underpin a study. At a general level, four major paradigms structure qualitative research: "positivist and post positivist, constructivist-interpretive, critical, and feminist post structural" (Denzin & Lincoln, 2005, p. 22).

My philosophical assumptions, as outlined in the previous section, are broadly reflective of the constructivist-interpretive paradigm in social science research. That is, knowledge is seen as being both individually and socially constructed (Stake, 2005) by participants and also by the researcher, with the researcher needing to interpret the meanings constructed by the participants in order to understand and explain them.

The paradigm of constructivism focuses on the ways that individuals engage with new knowledge (Hodkinson & MacLeod, 2007, March), considering that knowledge is created as we attempt to understand our experiences (Driscoll, 2000). Constructivism is the belief that knowledge is gained (not given) through real experiences that have purpose and

meaning for the learner, and through peer exchanges that add perspective to such experiences (Denzin & Lincoln, 2011; Piaget & Inhelder, 1969; Somekh et al., 2011). Constructivist principles acknowledge that real life is messy, fuzzy and complex (Siemens, 2014).

There are several forms of constructivism (Palincsar, 1998), and in this study it is the social constructivist paradigm that is focused on human interactions in work environments (Creswell, 2001) that was mobilised. In the social constructivist paradigm, researchers seek to understand the world in which they live and work by developing meanings from their experiences (Stake, 2005; Stark & Torrance, 2005). Knowledge is socially constructed (Barad, 1996), and the researcher looks for complexity and diversity of views and constructs conclusions from that research (Schwandt, 1997). This aligns with my own epistemological assumptions, as was described above, and therefore I considered that social constructivism was an appropriate paradigm for this study's context, given the focus on human KM interactions in a work environment and how learning happens to construct KM.

Research in the constructivist-interpretive paradigm poses the challenge of constructing meaning from the data (Scheurich, 1997) and of generalising the findings to other cases (Stake, 2005). I address this challenge in Section 4.8 by discussing how I developed strength and rigour in the meanings and conclusions that I drew from my data analysis to assist in the generalisability and transferability of the findings. Therefore, with these potential limitations of social constructivism acknowledged and managed within this study's research design, next I consider the research method that I deployed.

4.4 An Exploratory, Ethnographic Case Study

Consistent with my philosophical assumptions and the purpose of my study as discussed above, I adopted an ethnographic case study method (Denzin & Lincoln, 2011; Somekh et al., 2011) to investigate the three RQs within my study, acknowledging that case study may be more an approach to research than a method (Chadderton & Torrance, 2011), in that "as a form of research, case study is defined by interest in an individual case, not by the methods of inquiry used" and, as such, "case study is not a methodological choice, but a choice of what is to be studied" (Stake, 2005, p. 443). Thus, my research was defined as a case study as a result of my interest in the particular case of the research team of which I was a member.

Stake (1995) defined case study as "the study of the particularity and complexity of a single case, coming to understand its activity within important circumstances" (p. xi). The case study method enables the reader to consider how concepts emerge based on the evidence (Bell & Goulding, 1984; Nisbet & Watt, 1984). "Case studies have various advantages, in that they present data of real-life situations and provide insights into the detailed behaviours of the subjects of interest (Zainal, 2007, p. 5). Case study research is an in-depth analytical exploration of a particularity, that is properly examined and critically considered through a chosen literature-informed lens, with case study research well supported by Flyvbjerg (2006) who provides an endorsement of the single case study method. Rich data can be gained through using a case study method, and case studies can be very persuasive as they provide valuable insights (Patton, 1990) and rich contexts for the discussion of theory (Siggelkow, 2007), thereby offering a rigorous method for academic research (Denford & Chan, 2011; Taylor, 2004) and making it a rigorous method for my research purposes.

Furthermore, the case study approach is recognised as a legitimate method for mapping, describing and comparing the processes and practices of organisations (Yin, 1994) and "holds up well when compared to other methods in the gamut of social science research methodology" (Flyvbjerg, 2006, p. 244), especially when studying relational complexity (Flyvbjerg, 2001) and examining contemporary situations in education (Shen, 2009). The case study is accepted in both the education and business disciplines (Gorman, Hanlon, & King, 1997; Sawchuk, 2008), is well suited to understanding the interactions between technology and organisational contexts (Darke, Shanks, & Broadbent, 1998), and is gaining acceptance as a legitimate and valuable research method in a large number of diverse scientific domains (Baskarada, 2014). Through case studies, researchers hope to gain in-depth understanding of situations and meaning for those involved (Hancock, 2014). Therefore, the case study method was considered well suited to my study context.

4.4.1 The Exploratory Case Study

There are various approaches to the case study method, and I chose to use an exploratory case study. Exploratory research is a flexible and valuable tool for social science research (Babbie, 1989; Churchill, 1979; Kinnear & Taylor, 1996). A case study is well-suited to exploratory research, "when the phenomenon interacts with the context, and when the focus is on organisational rather than technical issues" (Iacono, Brown, & Holtham, 2011, p. 57). The objective of exploratory research is to assist in breaking broad and vague problems into smaller and more precise issues (Patton, 1990), thereby increasing the researcher's familiarity with a problem and clarifying concepts (Churchill, 1979; Miles & Huberman, 1995; Zikmund, 1991). My study adopted an exploratory approach, rather than an experimental or an explanatory approach, as I preferred to gain familiarity with and

clarity about the team KM dimensions with respect to the conceptual framework outlined in Chapter 3.

This study deployed an exploratory case study method for two other reasons: flexibility and feasibility. The flexibility afforded by an exploratory case study enabled the RQs and research design process to evolve and adapt continually as the study progressed to address a particular research problem. This study was an in-depth exploration of a contemporary phenomenon within its real-life context, where the boundaries between phenomenon and context are not clearly evident (Yin, 2013). The flexibility of the exploratory method enabled learning from the interactions among the participants during the study, and facilitate adjustment as required, rather than being fixed in a predetermined path. The feasibility of the exploratory case study was enabled by the interaction between researcher and participants. This interaction facilitated the collection of individual participants' data based on these real cases of analysis, and so offered a feasible approach to exploring my research problem and its three associated RQs.

The exploratory case study method can have some limitations. For example, the interpretation of case study findings is usually subjective and with small sample cases the results cannot be projected to a wider population (Zikmund, 1991; Miles & Huberman, 1995). However, other concerns with employing a case study method involve lack of rigour (with biased views influencing the conclusion), providing little generalisation (from a single site) and being difficult to conduct (owing to their length and amount of documentation) (Yin, 2013), although this can be managed through strategies such as triangulation, member checks and thick descriptions (Yazan, 2015), which I discuss in Section 5.7. Overall, for my exploratory case study approach, the wholistic, intuitive

aspects along with flexibility and feasibility benefits outweighed any of the potential limitations.

4.4.2 The Ethnographic Element

Within my exploratory "case study fashion" (Wolcott, 2004) approach, the method of ethnography (Frankham & MacRae, 2011; Wolcott, 1985) was pragmatically feasible, as I was actively engaged as a participant in the team context itself. Thus, this research is considered an ethnographic-like case study as it contains and demonstrates elements of both ethnographic study and case study. This case study scope focused on how and why the team managed their knowledge. Therefore, this study was a bounded ethnography, not anthropological, and thus ethnographic details not directly relevant to the case study focus were considered out of scope.

In particular, I was positioned in this ethnographic case study as a participant observer (Stake, 2005), and in doing so I took on a dual role of researcher and participant in the team operations (albeit as a student researcher rather than as an expert). However, I assumed the primary role of an evaluative, critical analyst of the case activities in order to address the study's RQs and to provide "grounds for validating the observations" (Stake, 2005, p. 456). An in-depth investigation of a single case by a participant observer can also be described as being neo-ethnographic (Stenhouse, 1983).

Thus, my own experiences and insights added further depth to the study from an ethnographic perspective. My dual role within the team (as participant and researcher) challenged me to examine and understand my own presence in and influences on this project (Scheurich, 1997), and this dual role aspect is further considered in Section 4.6 of

this chapter. The ethnographic aspect assisted me to gather deeper and more insightful data within my exploratory case study method.

My ethnographic observations in this study are interspersed throughout the thesis to support the other data sets. For example, the demographic data was consistent with ethnographic appearances and interactions, the MBTI data was consistent with observed actions and reactions to events, and the mandala data was consistent with the observed discussions and team engagements

Overall, I sought a research method to explore the what, how and why RQs in relation to the participants constructing their KM capacity and forms of capital within the university team context. Thus, the single-site, exploratory, ethnographic case study (Day Ashley, 2012; Hillyard, 2010; Mills & Ratcliffe, 2012) was considered an appropriate and acceptable method.

4.4.3 The Study Site and Participant Selection

The selection of the study site and of the participants is a vital research design aspect of single site, exploratory case study research of this kind, which is considered in this subsection.

In mid-2009, an existing research team within the (then) Faculty of Education at the study site university decided to recruit some new team members to bolster the original seven members' intellectual and workload resources. I was subsequently invited to join this team in the role of student researcher, taking the team membership to eight. Another member was added during my data collection period to assist with team administration, taking the total team membership to nine. I attended my first meeting with all the other team members in September 2009.

In early 2010, as I was contemplating potential PhD study sites and participants for a study of KM capacity, it seemed opportune that my study could explore this particular research team. Participants within the research team exhibited a high KM capacity within the university context, and I realised that the team reflected a contemporary standard of KM as good as or better than any that I would be likely to find in any other context. Thus, this team presented an appropriate opportunity for me to explore my KM research interests as a single site case study. My PhD supervision team agreed that this single case study site with nine participants would be suitable for my PhD study for four reasons.

Firstly, the nine participants formed (the individual level of) a single, formal research team (the team level) that was part of a regional Australian university institution (the organisational level). Therefore, this case study site provided me with ethnographic visibility at all three levels (individual, team and organisation) of my KM capacity construction concept (as was developed in Figure 3.2).

I point out here that one of the nine participants, Marge, joined the team in late 2010 in an administrative role within the team, rather than in a research role, and so her joining did not substantially change the team KM capacity or the team maturity. However, Marge was a member of the team on the 24 January 2011 at the commencement of the data collection period, and so she was included in the study data collection to gain her insights into and reflections on the team as is discussed in the RQ analysis. In some data analysis sections, only the eight research members of the team were focused on and Marge's data were not analysed, yet, so as to maintain the section numbering consistency throughout the thesis, Marge's data are sometimes intentionally left blank.

Secondly, the KM activities of this team appeared relevant to test my KM-Capital model, developed through my research in Figure 3.5. Therefore there was opportunity with

this team study to explore the KM interactions among the team members through various data collection instruments (such as interviews, focus groups, and ethnographic observations) to explore the complex and crucial interrelationships among KM capacity, competitive advantage and the different forms of capital.

Thirdly, the literature supports that a single case study site can be acceptable under certain circumstances. For example, it is recognised that, in cases where there are no other cases available for replication, the researcher can adopt the single case design (Zainal, 2007). This single case approach is an accepted method of academic research, and it enables control over, and consistency of, certain aspects of the study. Having only a single case study enabled my study context dimension (the organisational level) to remain consistent, such that the same organisational and environmental factors equally influenced each participant's KM capacity within the team. Owing to this advantage, the single site case study has been adopted in various previous studies (Taylor, 2004). While a single case itself is not of general interest, its value is based on the abstractions - that is, the transferability of the conclusions that can be drawn based on the case (Pohjola & Puusa, 2016).

Fourthly, this single case study site with nine participants was considered to offer sufficient variation on the KM interactions that were deeply explored through descriptive instruments, interviews and focus groups. Therefore my analysis of the participants' profiles enabled an exploration of the team KM capacity to address the three RQs. This case study site and the participants were effectively purposefully and opportunistically selected. Whilst this site was not necessarily a representative sample of the industry, it is contended that this research team was an appropriate case study site to explore the gap that exists in the body of knowledge pertaining to understanding KM in contemporary research teams.

With my PhD supervisors' consent, I enquired at the next team meeting whether the team would be interested in being participants in my PhD study. I presented an outline of my proposed study as being KM in teams. I highlighted that a potential benefit for participants would be that the study results could be of immediate and direct value to the team, by furthering their understanding of their own team dynamics and KM practices. The team agreed unanimously that they were willing to be the participants in my case study, and so this serendipitous opportunity resulted in this team becoming my case study site. Next I proceeded to complete the formal ethics and administrative processes to engage with this team case study site and its nine participants[6] properly.

4.5 Research Ethics, Risks and Politics

This study was designed in accordance with established ethical procedures for research involving human participants. As such, the main aspects of research ethics pertaining to this study were addressed through obtaining ethics approval, which included ensuring the informed consent of participants, and managing and maintaining participant confidentiality and anonominity through the use of pseudonyms. Other aspects included managing my dual role as team member and ethnographic researcher. Each of these aspects is considered in the following subsections.

4.5.1 Ethics Approval

Ethics approval for this research was obtained prior to the commencement of data gathering as required as part of ethical conduct in research involving humans (National

[6] Henceforth, I use the term "participants" in reference to the individual team members, as primarily, the team members were participants in this study and the data were analysed according to the participant context.

Health Medical Research Council [NHMRC], 2015). Application was made to the USQ Human Ethics Research Review Panel, which included the research proposal, data gathering instruments, participant information sheets and participant consent forms (please refer to Appendices B to H). The assessment of the risks associated with my research is discussed in Section 4.5.5.

4.5.1.1 Conditional Ethics Approval

The University Ethics Committee granted *conditional ethics approval* on 8 August 2010. The conditions required me to obtain the necessary study site approvals and to provide confirmation of my MBTI qualifications. The study site university's Dean of the Faculty of Education approved my research, subject to my supervisors' support and guidance, ethics clearance completions and approval from the university Deputy Vice-Chancellor (DVC) of Research. The DVC subsequently emailed approval to "carry out research within the Faculty". To meet the second ethics condition, I provided evidence of my MBTI accreditation qualification, as appears in Appendix B.

4.5.1.2 Full Ethics Approval

Full ethics approval was subsequently granted, (clearance number H10REA216) on 4 November 2010, as is shown in Appendix C, providing ethics approval for data gathering up to 1 July 2012. I then proceeded to gather formally the prospective participants' informed consents to participate in the study, as per the process detailed below.

Notably, a further extension for my data collection period was later requested, mainly to pursue obtaining the unreturned descriptive survey responses. This extension was approved (as H10REA216.1, granted on 15 June 2012), as shown in Apendix D, which extended my data collection period to 1 December 2012. Thus, my combined ethics

approvals formally authorised my total period of data collection for this study from 4 November 2010 to 1 December 2012.

4.5.2 Participant Consent to Participate in the Study

Following ethics approval, I sought to obtain informed participant consent prior to actually collecting any primary data. Participants should indicate their confirmation of their informed consent before they engage in a research study, acknowledging that their rights have been protected during the data collection (Creswell, 2003). The "participation information sheet" about the nature and purpose of the study and the "participant consent" forms are shown in Appendix E and F respectively.

The participation information sheet and participant consent forms advised participants of the purpose of the study, their voluntary role within it, and how their anonominity would be maintained through confidential record keeping. The forms also advised participants of their right to withdraw from the study at any time, and that their data would be collected over the study data gathering period. Participant confidentiality aspects are discussed further below, including participant pseudonyms, data storage and publications. Participants were advised that their likely time commitment required would be about five hours to complete all aspects of this research study. This consent to participate form was willingly signed by all participants prior to the commencement of any data collection (see Appendix G).

4.5.3 Participant Consent to Share Data within the Team

Also I realised that it would be beneficial for the team if I could obtain participant consent to share their data within the team. Therefore, I developed a "consent to share"

form (Appendix H). This "consent to share" form was specifically developed for this study to avoid any potential ethical complications in discussing my data insights within the team, regarding how and why they constructed their KM capacity. The "consent to share" form was also willingly signed by all participants as is shown in Appendix G. The original, signed copies of all the participant consent forms were filed appropriately in a locked cabinet. Also, for backup purposes, all the signed participant forms were scanned and kept on password protected hard-drives. Copies of these participant consent forms are not included in this thesis document so as to preserve participant anonominity and confidentiality. In retrospect, I think that the sharing of the team data within the team benefitted the team development, and it was vital that I obtained all team members' consent prior to sharing any study data within the team.

4.5.4 The Study Data Collection Period

Only once I had gained my formal ethics approval on 4 November 2010 did I begin to seek participants' consent. Once all required consent had been obtained, the collection of primary data effectively commenced on 25 January 2011 and continued until 1 December 2012, a period of just under two years.

4.5.5 The Management of Study Risks

Conducting research raises a number of risks that must be managed to maintain the ethical conduct required. In the interest of presenting this research as rigorous and credible, the potential risks were acknowledged through four perspectives: the risks associated with research design, the participant selection, time, psychology and confidentiality. These risks are discussed in this subsection.

4.5.5.1 Low Risk Research Design

Firstly, this research study has a low risk design, as it involved only consenting adults. The study topic explored participant KM capacity and experiences, with reference to their anonymised process, human, technology and context dimensions, and therefore this topic presented low risk to the adults involved.

4.5.5.2 Participant Time Risk

There were potential time risks as the data collection method consumed approximately five hours of the participants' personal time. To manage this risk, the time demands were disclosed to participants during the informed consent process, and adhered to during the study, meeting the requirements of the ethics approvals and thus minimising risks. All participants accepted this time commitment, even if it were sometimes difficult to schedule time with participants. Overall, the participants absorbed my study time commitment without complaints.

4.5.5.3 Participant Psychological Risk

There was a potential psychological risk to participants, as the data collection process prompted them to divulge some personal details, and some participants could have felt uncomfortable divulging such information. This risk was managed by advising all participants that they could withdraw from the study at any time, or not participate in any data gathering exercises, without any implications. This was communicated via the consent form process and reiterated prior to each data collection activity. Furthermore, participants were advised prior to their consent that they could approach the USQ ethics department and the USQ counselling service if they had any concerns about this research.

The psychological risk was also managed by advising participants that their data, in terms of their responses, results and comments would be securely and confidentially stored, and that their identity would remain anonymous in any publication beyond the team to protect all participants' confidentiality. In fact, various aspects of this study have already been published and presented during the course of this study, and all reference to participant data was anonymised to protect the participants' confidentiality.

These psychological risks were also managed by my "gentle" data collection techniques. I am skilled at applying the MBTI instrument and validating the results with participants during interviews, owing to my biographical background. Also I strived to probe gently in the interview, when honing in on some specific detail that might arise. This approach thus reduced the psychological discomfort of participants, and led to gathering insightful data from the interviews, focus groups and ethnographic observations, whilst minimising any psychological risks.

To counter further any participant time or psychological risk issues, I promoted the possibility that participation in my study offered some personal professional development, with a positive opportunity to reflect on, and to explore improvements to, their own KM practices, which in turn would enhance their own professional learning. I also highlighted that my data collection would be at their convenience, so that my research process would not interfere with any participants' work duties or their teaching and research schedules. Thus, participation in this research project offered some benefit to the participants' professional development, and minimal disruption to their workflow, which further reduced participants' personal and professional risk.

4.5.5.4 Participant Confidentiality

One potential risk of this study was maintaining the confidentiality of participant data. To manage this risk, as part of the informed consent process discussed above, I advised participants of three key strategies that I deployed to maintain the confidentiality and anonymity of their participant identities: the assignment of pseudonyms for participants; confidential data storage; and further deidentification strategies for publication.

4.5.5.4.1 Confidentiality by Pseudonym

A pseudonym was assigned to each of the nine participants to maintain participant confidentiality and anonymity. I did initially try to refer to participants as Participants A or B, but this sounded rather clinical and detracted the reader from getting to know and understand the individual team members' characters. Using pseudonyms made the data discussions personal yet prevented anyone from making connections that would breach the ethical confidentiality of this study. The pseudonyms are presented in Appendix G.

The pseudonym gender ("his" or "her") is consistent with actual participant genders as the study strength benefits from deep, rich description, and outweighs the minimal risk to confidentiality. Any references to participants throughout this thesis are made in the same consistent pseudonym sequence, as was presented in Appendix G. This order maintains structural symmetry and alignment across RQs1, 2 and 3 in Chapters 6, 7 and 8 respectively, for ease of reading flow and cross referencing. Occasionally, each participant is coded by the first letter of her or his pseudonym as was shown in Appendix G (e.g. Lucy is coded as "L").

The use of pseudonyms is not a perfect technique to maintain the confidentiality of the participants' true identities. No matter how careful a researcher may be, reducing people to anonymous beings so that their words and worlds can be analysed is really ethical only in so far as the people-as-researched themselves consent to this (Nespor, 2000). It is virtually impossible to preserve total anonymity (Merriam, 1998). I met this ethical dilemma by informing participants of the risks involved via the use of signed consent forms as was discussed in the previous section.

These pseudonyms were used during the interview data validation process and in the focus group discussions, so all participants were made aware as to which pseudonym represented who in the team, and all participants were comfortable with that. Therefore I consider there to be a minimal risk that participants can be individually identified beyond the team.

4.5.5.4.2 Confidential Data Storage

In terms of data storage, audio and photographic recordings of participants' engagement during aspects of the data gathering process were stored for review and analysis by the researcher. The audio recordings were transcribed for analysis. All data in digital form (such as these recordings, transcripts, photographs and analysis) were stored securely on a password protected, data encrypted, hard-drive in a locked cabinet since they were collected. Any data in physical form (such as printouts of draft chapters) have been stored in locked filing cabinets.

At the completion of my PhD study, the identifiable digital data will be erased and only the anonymised transcriptions will remain as the data set, stored for the requisite five years. Similarly, any hard copies of any data (such as printed transcripts or thesis drafts)

will also be placed in a locked filing cabinet for a five-year period after which they too will be destroyed.

4.5.5.4.3 Confidentiality in Publications

As the study findings were being documented in this thesis, participants' true identities were replaced with the above pseudonyms, so that no participant could be individually identified. Any discussion of the study data, and any publications to date have used these pseudonyms, and so the actual participants' true identities have always remained confidential. Any future publications related to this study will continue to anonymise identities with these pseudonyms to maintain participant confidentiality. The confidentiality of the focus group discussions cannot be guaranteed as they included all members of the team; however, focus group members were asked to respect the confidentiality of other members of the group. Through my use of secure storage, pseudonyms and de-identified data in publications, participant confidentiality has been maintained to a standard that meets my ethical requirements.

4.5.6 Ethics Completion

Thus, with all my ethics clearance approved, data collection proceeded until 1 December 2012. All aspects of my ethics approval (H10REA216) were adhered to in this research study, my data collection was successfully completed within the approved dates and no ethical issues arose, as was confirmed in my final ethics progress report submitted to the university ethics committee on 19 December 2014.

At the time of finalising this thesis for examination, no ethics issues or complications related to this research had been raised, and it is envisaged that this situation will continue.

The risks associated with this research were managed and all ethics aspects were adhered to; therefore the likelihood or consequence of any risk eventuating in the future is minimal.

4.6 Management of My Dual Role as Researcher and Team Member

Throughout the data collection, my dual role (as both PhD research student and research team member) at the case study site was continually and explicitly acknowledged. I had to be careful in my dual role of researcher and participant, as my biographical background could have influenced my bias and my approach to the research, which could have created a potential for both ethical role conflicts and inaccurate data analysis. I managed my dual role in a number of ways, as is discussed below.

Firstly, I managed my dual role by being primarily an ethical, ethnographic researcher, and placing my biographical team member interests as secondary. During the data collection period, my research role was of higher priority, superimposed on, yet superseding, my professional role in the team, also because I did not want to force my views on the team directions or personal dynamics, nor to create bias in the team decisions and actions. That said, when directly engaged or tasked by the team to assist in team operations, I always endeavoured to deliver professional outcomes. I consulted regularly with my supervisors to achieve a balance between my two roles and avoid any ethical dilemmas so as to deliver on both roles as appropriate.

Secondly, I was continually careful to separate my dual role explicitly and so minimise any ethical, biographical or research credibility risks. My dual role did become blurry at times, especially when I was working in the team member and researcher role simultaneously – such as when participating in team discussions as a constructive team member whilst also observing team operations and interactions as a researcher. However,

usually I was clearly focused separately on my researcher role, such as when facilitating the focus groups or conducting interviews and MBTI assessments.

Thirdly, I consciously strived to manage and minimise my biographical and ethnographic assumptions, biases and paradigms to remain objective in my researcher role and achieve objective conclusions from my observations and results. I was aware that as an ethnographic observer, I was the primary instrument for data collection and analysis, and that the data were mediated through me (Merriam, 1998, p. 7). Accordingly, I needed to be sensitive to the biases inherent in this kind of research (Merriam, 1998, p. 22) and to the need to make my assumptions and paradigms explicit at the outset of the study and to continue to consider these aspects in my reflexive journal.

Despite the potential confusion in switching between the dual role, this ethnographic approach resonated with me, as it enabled me to appreciate more fully the deeper dynamics within the team operations, as is discussed in Chapters 6, 7 and 8. I found that, as an ethnographic researcher, my observations went beyond the superficial façade of faces and places to enable deeper, richer insights into the qualitative KM operations and dynamics.

Notwithstanding the care that I took to separate my dual role, my research did produce insights of which the team members were made aware, such as the MBTI dynamics and the Mandala results, and so my research did influence the team in some ways towards their professional development. However, I contend that my research did not fundamentally alter the teams inherent KM capacity in such a way that it affected the credibility of my data collection and analysis. In the interest of transparency, I acknowledge my dual role as an issue that I consciously managed during the conduct of my study to minimise risks and concerns.

4.7 Management of the Research Limitations

The research design method for this exploratory case study presented several limitations that are acknowledged in this section. Whilst this research study has achieved a number of things to deliver strong, rigorous findings, it was also *not* a number of other things. There were several practical and resource constraints that limited this research in some crucial respects and that bounded the study's scope. The main limitations of this study arose from the broad yet thin focus required to achieve coverage of this wholistic study's scope, and from the acknowledgement that the scope could yet have been broader to include other subdimensions of the process, human, technology and context dimensions of KM capacity. Another limitation was the limited generalisability of the case study design, as was discussed in Section 4.4. Overall, despite these limitations, this research design of a qualitative exploratory case study has delivered rigorous research findings in response to the RQs.

4.8 The Strengths and Rigour of this Study Design

This section discusses the strengths and rigour of my study design, with particular attention being given to the strategies used in the analysis and interpretation of data from each of the data collection lenses, in order to contribute to the credibility of the findings and conclusions. I acknowledge that it is impossible for other researchers to conduct a repeat study of the same case that I did, as the participants in the study and their respective KM dimensions have all evolved over time, and so any similar study would expect different findings. However, this section addresses how the study design delivered results that are credible, dependable, confirmable and somewhat transferrable, and how those results also provided defensible responses to each of my RQs.

The quality and rigour of a study are vital to supporting good academic research (Golafshani, 2003). There are various ways to assess a study's strength and rigour, one way being to apply the constructs of credibility, dependability, confirmability and transferability as criteria (LeCompte, Preissle, & Tesch, 1993; Lincoln & Guba, 1985; Merriam, 1998). These four constructs have been utilised as appropriate ways to support the rigour of various other studies (Harreveld, 2002). As such, they are similarly utilised to support my study's strengths and rigour, as detailed below.

4.8.1 Credibility

The establishment of truthfulness and trustworthiness of the study's reconstructions and interpretations builds the credibility of academic research (LeCompte et al., 1993; Lincoln & Guba, 1985; Merriam, 1998). Credibility is established through a conceptual framework and its collected data (LeCompte et al., 1993; LeCompte & Schensul, 1999). My utilisation of the conceptual framework (Chapter 3), the case study method and the triangulation of various collected data sources in my data analysis procedures, has enabled me to consider KM capacity with credibility and rigour.

Credibility or rigour can be defined by five aspects: the researcher's presence, the nature of the interaction between researcher and participants; the triangulation of data; the interpretation of perceptions; and rich, thick descriptions (Merriam, 1998, p. 151). My research presence and interactions were managed by acknowledging my biographical context (Section 1.7), my assumptions (Section 4.3.2) and my dual role (Section 4.6).

I adopted various strategies to manage my biases and to strengthen my case study's credibility and reflexivity. Firstly, I was very aware of these risks during the collection, analysis and interpretation of the data, and I allowed only the data to influence and form

my conclusions. I contemplated my biases in my reflexive journaling and my retrospective self-reflection as part of this thesis narrative. I also managed my research presence and interactions, data triangulation, and the interpretation of my perceptions, as is discussed separately below.

My research presence and interactions as an ethnographic participant in this study, in the dual role of both researcher and team member, have been defined in this chapter. This ethnographic participation enabled a prolonged engagement period (two years) of being "in the field" with the participants, as was detailed in the data collection process. This enabled me to have persistent observation of and in-depth focus on, the specific factors and context pertinent to all RQs of this study. Whilst the prolonged and "biographical" research nature of this study introduced potential risks, these risks were addressed in Section 4.5 and considered to have minimal impact. In my study, the limitations of my presence and interactions with participants were managed by the fact that all participants were in fact qualified researchers themselves and so understood and accepted my research orientation, paradigm and method.

Triangulation was achieved by considering all the data collected from my multiple data sources. One common solution to increase the study's credibility and to help to justify research results has been to employ "triangulation", which is using multiple data collection techniques (Tawney, 1976) in "an attempt to secure an in-depth understanding of the phenomenon in question" (Denzin, 2012, p. 82). Triangulation is defined as "a process of using multiple perceptions to clarify meaning, verifying the repeatability of an observation or interpretation" (Stake, 1998, p. 97).

As is detailed in Chapter 5, in this study I deployed multiple data collection tools, instruments and methods in both desktop and field research, including secondary document

analysis, descriptive surveys, a Wordle analysis, artifacts, a Mandala artwork focus group, a feedback focus group, semi-structured interviews and ethnographic participant observations (Denzin & Lincoln, 1998; Fife, 2005; Lincoln & Guba, 1985; Merriam, 1998; O'Reilly, 2005). These multiple data sources enabled data triangulation to address the RQs.

For the interpretation of perceptions, one technique is to select dimensions for the study, as suggested by the existing literature, and then to look for data similarities and differences, and to proceed to build and test a conceptual framework theory (Eisenhardt, 1989). This was the process that I pursued in iteratively developing the content of my thesis, developing my KM dimensions and my conceptual framework from my synthesis of the literature, and then refining my models and frameworks to reflect my data analysis findings.

The credibility of this research was also supported by maintaining an audit trail (Lincoln & Guba, 1985; Merriam, 1998). My data were collected and compiled over the two-year data collection period, consisting of auditable references, such as audio recordings and transcriptions thereof, surveys and observations. In the following subsections, I have qualified how the research design achieved an interpretation of the collected data through the data analysis process, and this is elaborated in the data analysis chapters 6, 7 and 8. However, my referential archives can always be re-visited in order to test, confirm and benchmark my data analysis findings for the adequacy of my interpretations.

Overall, this research addresses the case study design limitation through the above techniques to build credibility into the research conclusions. It also applied the philosophical logic of syllogism (Aristotle, 322BCE) by referencing existing literature to detail a series of plausible statements (the four KM dimensions and their relationship with Bourdieu's [1986] forms of capital), which were then logically linked with my case study's

empirical findings to support my own concluding KM capacity-capital concept, which has together been presented as a credible thesis.

4.8.2 Dependability

The dependability of a qualitative research design relates to the extent to which it can be depended upon to provide consistency and credibility of findings – in a similar way to how a quantitative study produces reliability (LeCompte et al., 1993; LeCompte & Schensul, 1999; Lincoln & Guba, 1985). My research design and its implementation produced trustworthy (i.e., credible) results through the application of prolonged engagement, participant observations, triangulation and peer debriefing and checking, as is discussed in this section, all of which have enhanced the dependability of my study.

Dependability also relates to how changes in the study data are accounted for and the research design consequences (Wollin, 1996). My exploratory study design was adapted to clarify data as required, repeating or adding interview and focus group questions as needed, and confirm MBTI and Mandala results with participants, in line with the research design. The combination of data sources enabled me to triangulate, validate and confirm my data results in an iterative process over the two years of data collection. In this way, my data and results are dependable.

4.8.3 Confirmability

Confirmability relates to the fit between the data and the conclusions and whether the study results can be confirmed (Wollin, 1996). The establishment of confirmability in a research study relates to the quantitative paradigm notion of “objectivity”, where the neutrality of researchers is considered vital lest they contaminate the objectivity of their

results (Schwandt, 1997). To assist my study's confirmability, I validated participant data by member checking with participants regarding various data and conclusions. Such validation, as well as peer debriefing with the team and my supervisors, all built confirmability as well as dependability and credibility, into my study.

There were two main limitations associated with conducting the member checking activity to validate results. The first was that in a time limited study, the member checking added pressure to organise and conduct the process efficiently and effectively. Secondly, it introduces the dilemma of having to unpack any member validation differences to ensure confirmable data. The member check validation outcomes are presented within the data analysis (Chapters 6, 7 and 8).

Moreover, in the qualitative, social constructivist paradigm in which my study was situated, confirmability relates to examining the research design (the RQs, participant selection, data collection methods, audit trail and analysis activities), with a focus on the interpretation of the data. Another strategy to check subjectivity and to confirm trustworthiness of my findings is member checking (Creswell, 2003), which I achieved by feeding my data results back to the participants, so that they could validate my interpretations, and I could gain further insight. This member checking was done during the interviews, Focus Group 3 and also through my peer-reviewed publications and presentations. Therefore, despite this being a single site case study that is impossible to recreate and retest, the study was supported by rich, thick descriptions within Chapters 6, 7 and 8 of the thesis to enable the reader to assess the confirmability of the study and to accept its credibility.

4.8.4 Transferability

Transferability refers to the ability to demonstrate the applicability of one set of findings to another context. In observing sound and credible practices and in using appropriate research strategies, transferability will be maximised (Marshall & Rossman, 1994). Consideration of the transferability of this study is appropriate to address concerns regarding both re-using and re-purposing the study design to benefit future research situations, and secondly to reflect on whether the findings would also apply (transfer) to other, similar contexts.

As was mentioned previously, despite this research being a single site case study, some findings and conclusions may be transferrable. A common criticism of the case study method is its dependency on a single case exploration making it difficult to reach a generalisable conclusion (Tellis, 1997). The reduced transferability of using a qualitative case study method is offset by the rich and valuable insights gained (Patton, 1990). To maximise the transferability of the findings, I aimed to provide adequate detail to enable comparison with other cases (Guba & Lincoln, 1985) and so to support "naturalistic generalisation" (Stake, 2005, p. 454) as well as theoretical generalisations (Dick, 1990). From the rich, thick descriptions evident in this thesis, other researchers and readers are able to self-assess the applicability that each component of this study may have to their own unique situations (LeCompte et al., 1993), with all my data combining to enable triangulation. Data triangulation facilitates transferability, as it strengthens the way that the study is "structured, highlighted, subordinated, connected, embedded in contexts, and embedded with illustration" (Stake, 1998, p. 95). Based on these data triangulation aspects and the rich, thick descriptions provided, readers can self-determine the transferability that this study may contribute to comparable case study situations.

4.8.5 Conclusion to the Strengths and Rigour of this Study Design

The construct of credibility has been achieved in this study through appropriate design deployment, data analysis and documentation to a level required for an academic study of this nature. Table 4.1 was developed for this study, adapted from a similar construct by Creswell (2003, p. 196), which assists in further supporting and summarising how research strength and rigour were evidenced in my study.

Table 4.1: Evidence of Strength and Rigour within My Study

Strength and Rigour	**Strategy and Action**	**Evidenced in my study**
Credibility, Dependability, Confirmability	Triangulation to examine evidence from different data sources to build a coherent justification for themes.	Multiple sources of data (surveys, interviews, focus groups, ethnographic observations, reflexive journal) were analysed
Confirmability, Credibility	Member checking to check subjectivity and ensure the trustworthiness of the findings.	Data, interpretations, and conclusions were tested and validated with the participants from whom the data were originally collected. This validation was conducted during the interviews, focus groups and publications.
Transferability, Credibility	Rich, thick descriptions to convey the findings in a way that may transport the readers to the setting and give the discussion a sense of shared experience.	My findings have been presented in descriptive, narrative form within the thesis.

Credibility, Confirmability	Management of my bias to create a narrative that resonates with readers.	My biographical situation, research assumptions and dual role were acknowledged. I conducted explicit, reflexive journaling during data collection, including retrospective self-reflection as part of the thesis narrative.
Dependability, Credibility	Spending a prolonged time in the field to develop an in-depth understanding of the case, and to convey detail about the context and participants.	As an ethnographic member of the team, I obtained extensive knowledge of the context, and observation of the participants.
Dependability, Credibility, Confirmability,	Peer debriefing, by locating a person to review and ask questions about the findings as they emerged.	I had both informal and formal discussions with team member peers, combined with periodic reviews with my PhD supervisors.

Table 4.1 summarises how the credibility, dependability, confirmability and transferability were achieved in my study, through triangulation of data, and analysis methods. The aspect of transferability and generalisability were managed by providing rich description such that the reader can self-assess potential similarities with another context. Numerous publications pertaining to aspects of this study have been presented for peer review, and feedback on this study thus far has been positive. Whilst I readily acknowledge various limitations surrounding this study, as discussed in Section 4.7, I considered that none of those limitations would significantly undermine this study's strengths and rigour. Furthermore, the above strategies to increase the study's credibility, dependability, confirmability and transferability assisted in overcoming research limitations and have

been strongly adhered to. Therefore it is considered that the research design of this study has delivered strong and rigorous results.

4.9 **Conclusion**

In summary, this chapter has described the research design philosophy for a qualitative, ethnographic case study in order to address the three RQs of this study and to expand theoretical knowledge to assist in addressing research gaps in the literature. The study design philosophy adhered to ethical research practices, was clearly bounded by the data collection period, and enabled me to manage the related risks as discussed in Section 4.5, my dual role (Section 4.6) and the research limitations (Section 4.7) and to generate data that were analysed to build strength and rigour into my research, as was discussed in Section 4.8. This all supports defensible conclusions with the overall aim of making contributions to the body of knowledge pertaining to KM capacity within a team and to its relationship with capital. The next chapter details the data collection and design that were deployed to answer the three RQs and to address the research problem.

5. THE DATA COLLECTION AND ANALYSIS TECHNIQUES

5.1 Introduction

This chapter continues from the Chapter 4 discussion of the research philosophy to explain the specific data collection and analysis techniques deployed in this study. This includes a discussion of the sources of data and how the study findings were generated and presented to address each of the three RQs, enabling me to construct a comprehensive and credible view of *how and why* KM capacity was constructed within the university education research team, and the relationship between that KM capacity and Bourdieu's (1986) forms of capital. Please note that this chapter only *describes* the RQs1, 2 and 3 data collection and analysis techniques. The actual data analysis and findings for RQs1, 2 and 3 are presented in Chapters 6, 7 and 8 respectively.

5.2 The Structure of this Chapter

Section 5.3 further explains the RQ-data collection-data analysis linkage structure utilised in this thesis, adding detail about how the data sources aligned to address the RQs. The chapter then details the data collection and analysis design that was developed and deployed to address RQ1 (Section 5.4), RQ2 (Section 5.5), and RQ3 (Section 5.6). The rigour of this data collection and analysis procedure is explained in Section 5.7, before Section 5.8 concludes the chapter.

5.3 The RQs-Data Collection-Data Analysis Linkage

An advance organiser of the RQs-Data Collection-Data Analysis linkage structure of this thesis was provided in Table 1.2, which presented a broad orientation to the contents of Chapters 6, 7 and 8 to inform how this thesis ties together to explore wholistically the construction of KM capacity and forms of capital.

To inform this RQs-data collection-data linkage structure further, Table 5.1 outlines the data sources analysed for each RQ with respect to each of the four KM capacity dimensions (process, human, technology and context respectively), as was discussed in Chapters 2 and 3.

Table 5.1 shows how the multiple data sources are analysed with respect to the KM capacity dimensions to address iteratively RQs1, 2 and 3 whereby " ✔ " symbolises analysis as a primary data source, and " ✔ " denotes the use of a secondary data source to support and triangulate the findings. The Table 5.1 data sources and analysis components are explained later in this chapter, and are referred to in Chapters 6, 7 and 8, as the structure through which the data analysis has been conducted and presented.

Table 5.1: Data Sources to Address the RQs

Data Sources	RQ1				RQ2				RQ3			
	P	H	T	C	P	H	T	C	P	H	T	C
CISUS survey	✔				✔				✔			
Wordle	✔				✔			✔	✔			
Interviews	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Ethnographic Observations	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Demographics		✔				✔				✔		
MBTI (Participant)		✔			✔	✔	✔	✔		✔		
MBTI (Team)						✔				✔		
MBTI (Organisation)						✔				✔		
Focus Group 1		✔				✔				✔		
Focus Group 2 & Mandala		✔		✔				✔				✔
ICT Survey							✔				✔	
Office Photos			✔				✔				✔	
Focus Group 3					✔	✔	✔	✔	✔	✔	✔	✔
Team Publications					✔	✔	✔	✔	✔	✔	✔	✔
My Publications					✔	✔	✔	✔	✔	✔	✔	✔

5.4 The RQ1 Data Collection and Analysis

The following subsections detail analysis of the collected data sources related to RQ1 in order to enable insights into the individual profiles of each participant in terms of their KM capacity (process, human, technology and context) dimensions. Various data sources

were analysed, as was outlined in Tables 1.2 and 5.1, to develop the RQ1 profile of *who and what* the participants looked like, with respect to their KM capacity, and thus to inform the analysis that related to RQ2 and RQ3.

5.4.1 The Process Dimension Profile

A profile of the process dimension was established by gathering and analysing data about participants' KM capacity process dimension engagements. The data analysed included interviews, ethnographic observations, the CISUS survey, and also publications (via a Wordle), as is discussed below.

5.4.1.1 The Interviews

Qualitative, semi-structured, individual interviews were conducted with all participants to obtain deeper, triangulating, qualitative data about all four KM capacity dimensions, and to explore and validate findings from other data collection sources. Interviews with each participant were arranged around the availability of participants rather than in any pre-determined order, and they were conducted between June 2011 and November 2011, as is detailed in Appendix I.

The purpose of the interviews was to validate the participant's KM capacity profile (for RQ1) and then, in relation to RQs 2 and 3, to explore how and why the participants constructed their process, human, technology and context KM capacity dimensions. I sought to encourage the participants to share their insights with me, and I attempted to pose clarifying or probing questions to stimulate and acknowledge their views as required.

There are three main types of questions to utilise in an interview: open-ended questions, closed questions and probes. Open-ended questions encouraged interviewees to respond with richness of detail with questions such as "How did you go about creating

knowledge?" Closed questions limited the responses given by the interviewee to a short answer such as a "Yes/No" or a number. For example, "Did you save that data electronically?" Probes were questions to seek more meaning or clarification to expand or follow-up on the interviewee's responses. Probes may be either open or closed questions, such as "How did you do that?". The interviews were semi-structured and included all three types of questions to elicit and explore participants' perspectives on the topic.

The guiding questions of the semi-structured interviews are shown in Appendix J; they were approved by the ethics committee and provided a similar structure to each interview. Whilst ethnographers do not usually decide beforehand the exact questions that they want to ask in interviews, and while they do not ask each interviewee precisely the same questions, it is also never simply a conversation as the ethnographer does have a particular research agenda (Hammersley & Atkinson, 2007). My interview questions were refined after each interview to focus on revealing aspects of emerging concepts that were determined to have particular significance.

This semi-structured approach worked well, as it created an organised approach to the interviews that participants seemed to appreciate (especially those who had a "J" MBTI preference). The semi-structured approach also created a logical flow to the line of questioning, enabling the interview discussion to flow naturally, yet also to cover the scope required in relation to RQ2. Thorough and systematic notes were taken during the interviews to complement the interview audio recordings. The audio recordings from each interview were transcribed, enabling a systematic analysis to compare and link themes for commonality and divergence within the qualitative data. Furthermore, the interviews provided an opportunity for further discussion as a means of triangulation and validation of the other data sources analysed. For example, the Wordle, MBTI and Mandala data

analysis results were validated and further discussed in each interview, as were aspects of the office photos and the technology survey.

5.4.1.2 The Ethnographic Observations

The collection of my primary ethnographic data evidence to respond to RQ1 (and also RQ2 and RQ3) formally commenced immediately after the participant consent forms had been signed in December 2010, and it continued over the whole data collection period until my ethics approval ended on 1 December 2012.

Team meetings occurred on approximately a monthly basis during the data collection period, and I attended every research team meeting over the data collection period in the capacity both as "myself as team participant" and also as "an ethnographic researcher". My attendance at the team meetings provided great insight into the KM capacity of each participant as I could observe the technologies and personal dynamics related to how they created, improved, stored, used and shared their knowledge. These observations validated my analysis of the other data sources to enable deep, rich insights into KM capacity that related to all three RQs.

My ethnographic notes of team meeting minutes, interactions and observations and my critical reflections and insights into the team KM capacity were compiled into a reflexive journal to maintain the chain of evidence, with relevant observational references linked with the participant's pseudonym. The recording, storing and retrieving of data must be viewed as part of a reflexive process, supporting any changing methodological, practical or ethical reasons (Hammersley & Atkinson, 2007).

The individuals within the team displayed a variety of KM capacities during this observation period, and my note-taking during team meetings provided ample data for

analysis to improve the study's credibility. My data analysis incorporated thick, rich descriptions of reflections on my critical experiences as a participating ethnographic researcher. Thus, my ethnographic observational analysis was triangulated with analysis of other data sources.

5.4.1.3 The CISUS survey

A qualitative survey (see Appendix K) was designed as part of this study to gather descriptive data about the participants' KM process dimension capacity experience by exploring how frequently (daily, weekly, monthly) each participant went about her or his own create, improve, store, use and share (CISUS) KM process dimension activities. I have called this data source the "CISUS survey" as the results provided specific evidence about the participants' CISUS process activities.

My analysis of the returned CISUS activity surveys revealed a profile of how frequently participants were engaging in CISUS process dimension activities in the construction of their KM capacity. The CISUS activity survey data were then triangulated with the interview and ethnographic observations to provide additional insights to support my conclusions relevant to RQ1 and to validate the findings. The CISUS survey findings informed the analysis related to RQ2 and RQ3.

5.4.1.3.1 The Survey Design and Pilot Testing

It is important to reiterate here that this research followed a qualitative orientation, and that the CISUS survey and all other surveys used in this study were intended to provide descriptive evidence to support the other data sources that explored KM capacity, with no intention to analyse any quantitative data statistically. A draft version of all surveys being

utilised in this study was approved in the original ethics clearance, where it was noted that further refinements would be made prior to deployment.

Whilst a pilot test of the survey was not essential, as the results were not going to be analysed quantitatively, a pilot test was considered useful to help to refine the survey design. Therefore, prior to their deployment in this study, a pilot test of all surveys was conducted with six participants from the university's academic staff who were not involved in my study but who were of a similar demographic to the actual research study participants. The pilot study provided an opportunity for feedback to refine the survey structure, format, descriptions and questions, and thus to improve the content relevance and robustness of the instrument to extract appropriate and trustworthy descriptive data about the participants' KM capacity dimensions.

The final surveys were resubmitted for ethics clearance and subsequently approved. All surveys used in this study appear in Appendices 5.1, 5.2 and 5.3. These surveys form one output of the PhD study, as they may be useful to refine and deploy in any future studies on this topic.

5.4.1.4 The Wordle

The team being researched in this case study described themselves as "bringing together expertise and experience from a range of areas and sectors within the field of education" (Case Study Team, 2011b). For RQ1, I sought to visualise this "range" of specialist knowledge that each participant was processing to depict her or his KM process dimension profile. From my comprehension of the CISUS model (see Figure 2.6), the knowledge that participants would create, improve, store, use and eventually formally share as a publication output was available for analysis as a measurable secondary source of

evidence. That is, the specialist knowledge being processed by each participant was analysed by constructing a "Wordle" of her or his publication titles.

The Wordle analyses a text, and compiles a cloud of that text's word contents, whereby the font size of the words in the word-cloud relates to their frequency of use in the text being analysed. In this way, the Wordle is an information visualisation method that provides a portrait of a person's interests, as the application analyses the text data to display a word cloud (Feinberg, 2010). The Wordle thus provides some content analysis of a text, which can provide an indication of knowledge interests (Julien, Pecoskie, & Reed, 2011). In this case, the website wordle.net provided a content analysis of each participant's publication titles and produced the Wordle to provide a visual snapshot that profiled what knowledge each participant was focused on processing.

The Wordle pictures provided an evidence-based prompt within the individual interviews to elicit deeper insight, engagement and validation from participants about the knowledge focus that they were processing. For example, during the interviews, I could have asked each participant: "What are the top five areas of knowledge that you focus on processing?", and then taken on face value that the participant had responded accurately. Instead, the Wordle provided a data-based evidence source to support the query: "This is the Wordle of your publication titles – does this reflect the knowledge that you focus on processing?" As a result, the Wordle prompted each interviewee to respond quickly and accurately, gathering deeper, richer and more specific insights into overall participant KM capacity in the process dimension.

As each participant's Wordle was validated through the interviews, and also by my ethnographic observations, this allowed triangulation of my process dimension data analysis that added strength and rigour to the findings. The point of the Wordle was to show

this similarity within the team KM focus in a visual way, based on study evidence. I acknowledge one limitation of the Wordle is that by distilling this data set down to just the most frequently used words, the nuances of the knowledge focus specialisation evaporate, increasing risk of inaccurate perception. However, the resulting Wordle was reviewed and validated by each individual participant as being representative. Therefore, this risk of inaccuracy was minimised, and the Wordles stand as another data set to provide evidence that reveals the unique profile of team KM capacity in the process dimension. The Wordle visualisation analysis, combined with the participants' validation and their clarifying remarks, thus succinctly provided an evidence-based profile of the knowledge focus and specialisation that each participant was processing.

5.4.2 The Human Dimension Profile

The human dimension of this case study collected both surface level and deep level participant data. The surface level related to demographics, whilst the deep-level explored personality (Mohammed & Angell, 2004). This study deployed a descriptive, demographic survey to gather surface level data and identified the participants' MBTI preferences to obtain a deeper level profile of the participants' human dimension as discussed separately in the subsections below.

5.4.2.1 The Demographics

At the outset of the data collection, I realised that the demographic details needed to be measured formally in order to provide my study with defensible evidence that could be triangulated with my interview and ethnographic data. Demographics provide important insights such as an individual's title, backgrounds, ethnicity and gender, which then enable insight into how and why the characteristics of a team or an organisation are changing over

time (Beckman & Burton, 2011). Therefore a descriptive, qualitative survey was designed as part of this study to collect surface level demographic data, and this appears in Appendix L. The demographic survey obtained specific, descriptive detail data about the particular participant's demographic details that were deemed relevant to KM capacity, such as age, gender, ethnicity, education level, background, and organisational tenure. The participant data were subsequently tabulated to enable the surface level, demographic human dimension profiles of all participants to be compared.

5.4.2.2 The MBTI

The deeper level of the human dimension of the team was explored by deploying the MBTI Form M to collect data that identified each participant's (human dimension) MBTI personality preference. The content of the MBTI Form M is not detailed in this thesis as it is copyright protected and restricted for use to CPP qualified practitioners only, and it was the actual MBTI result that the Form M produces that was important for this study, rather than the Form M structure, content and calculations which are outside the scope of this study's consideration. Therefore only the Form M results are disclosed in the data analysis chapters.

The validity and reliability of the MBTI Form M result were increased by discussing and confirming the Form M result with each participant in her or his individual interview. The results were also repeatedly validated during Focus Groups 1, 2 and 3, and were triangulated with my ethnographic observations. Furthermore, as the participants in this study were mature, stable, educated adults, participants had consistent MBTI alignment throughout the data collection period. Overall, the participants were given multiple opportunities to review and reflect on their MBTI analysis, and this confirmation,

validation and triangulation process alignment produced an appropriately accurate and precise MBTI profile of participants that is considered acceptable for the intent and purpose of this research.

Also, to protect the data confidentiality and participant anonymity, the MBTI Form M instruments completed as part of this study were electronically scanned, stored and backed-up on password protected hard-drives. The hard copies of the forms were destroyed, and the MBTI data are presented in Chapter 6 with reference to the participants' pseudonyms.

5.4.2.2.1 The MBTI String Diagram

A significant innovation in my Form M data analysis was the development of a "string diagram" in order to achieve better visualisation of participant MBTI personality preference clarity. The Form M analysis identifies a participant as exhibiting either a Very Clear, Clear, Medium or Slight preference based on the tally of their Extroverted/Introverted (E/I), Sensing/Intuiting (S/N), Thinking/Feeling (T/F) and Judging/Perceiving (J/P) dichotomy question responses. In my experience, the MBTI results do not fully utilise this clarity, or strenght of preference information in one's MBTI result, instead merely summarising a particpants' preference according to the four dichotomies - for example, "ISTJ" or "ENFP". Using just the four letter preference ignores the reality that a group of ISTJs could include one very clear ISTJ, whilst the others might have only a slight ISTJ preference, and yet they are all put into the same four letter ISTJ box that makes it difficult to analyse the subtle differences amongst them. Therefore, the clarity of the participants' MBTI preference was fully utlised in my data analysis to detail this subtle "granularity" of MBTI diversity.

The "string diagram" was developed as part of this study to improve the visualisation of participant MBTI preference clarity, by plotting the four MBTI dichotomies across the X axis, and the clarity of the individual dichotomy preference on the graph's Y axis. The innovation here was to have the "zero" of the Y axis in the middle of the page, such that the dichotomy could be plotted above and below that centre line. The Y axis plot was then constructed according to whether the participant Form M preference clarity was "slight" (S), "medium" (M), "clear" (C) or "very clear" (VC). For example, Emma's Form M result was ENFJ, with the clarity data being E (Very Clear 17E/4I), N (Very Clear 1S/25N)), F (Slight 13F/11T) and J (Clear 19J/3P). My MBTI "string diagram" enables the visualisation of Emma's MBTI clarity so that the reader can instantly comprehend the granularity of her preference. I called each participant's MBTI demographic graph a "string", as it looked like a string, with the shape of the string symbolically revealing the participant's MBTI profile subdimensions. The participant MBTI string diagrams appear in Section 6.4.

In a 2018, I found a similar presentation of my string diagram, called the MBTI Preference Clarity Index (Consulting Psychologists Press [CPP], 2008; Myers et al., 2003), with an example shown in Figure 5.1.

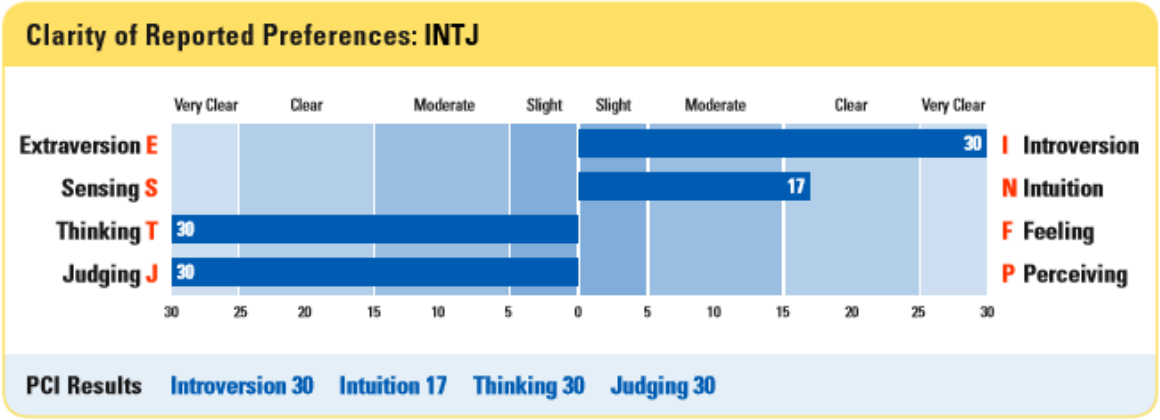

Figure 5.1 The MBTI Preference Clarity Index (PCI) (CPP, 2008)

My recent discovery of this PCI helps to confirm and reinforce my independent string diagram design, and I asset that my "string diagram" has merit over the MBTI PCI for two reasons. Firstly, the string diagram visualisation technique increases the comprehension of participant MBTI profile clarity and granularity with a unique string, rather than a plain bar graph. Secondly, and more significantly, the string diagram enables the combined MBTI preference results of multiple individuals (e.g. in a team) to be superimposed on one page, with each individuals preference string overlaid to enable comparison and contrast of the team MBTI dynamics, as can be seen in the example in Figure 6.21. That is, the "combined string diagram" enables the granularised visualisation of the diversity dynamics among many individuals' MBTI preferences for comparative analysis. Thus, despite this recent PCI finding, my string diagram technique is still considered a novel methodological contribution of this study for enhanced empirical analysis of the MBTI Form M data source.

5.4.2.3 The Focus Group 1: MBTI

Focus Group 1 was held as part of the team planning day on 24 January 2011, whereby the "combined team MBTI string" was presented to the team for further validation. The Focus Group also discussed the MBTI preference similarities and differences within the team, and how their diversity helped to construct their KM capacity (RQ2) and their selected forms of capital (RQ3).

The individual responses gained in focus group discussions were qualitatively richer than those obtained in the MBTI and other surveys, as participants had the opportunity to open up more about their preferences, and this also provided a triangulation of the data.

5.4.2.4 The Interviews

The interview sessions enabled validation and triangulation of each participant's human dimension profile as was shown in Table 5.1 and as was discussed in Section 5.4.1.1.

5.4.2.5 The Ethnographic Observations

My ethnographic observations of participants enabled triangulation with other data sources to strengthen my findings about each participant's human dimension profile as was shown in Table 5.1 and as was discussed in Section 5.4.1.2. My ethnographic observations of participants augmented insights from other human dimension data sets, particularly with the MBTI analysis findings as my professional comprehension of observing participant KM constructions could be aligned with their reported MBTI preferences.

5.4.3 The Technology Dimension Profile

The technology dimension profile of the participants was obtained by analysing a photograph of the participant's office, which provided the reader with an indication as to the level of technology being utilised by each participant.

5.4.3.1 The Office Photos

Photographs of each participant's office were obtained during the interview sessions, and these photos formed artefacts that were analysed to inform the RQ1 technology profile. The office photo was supported by my interview questions regarding participant technology skills and usage, as well as by my ethnographic observations, which triangulated and provided further granularity about the technology dimension. The photo provided more overall, descriptive data to inform the reader about the KM capacity technology that surrounded the participants in their professional office place, and to contextualise and

consider each participant's KM capacity. The office photos also provided evidence of the integrated, wholistic nature of KM capacity, as the human dimension (the participants) utilised the KM technology dimension contained within their respective offices as a way of engaging with the process dimension to create, improve, store, use and share knowledge for specific purposes. This RQ1 office photo analysis informed the analysis of the technology survey deployed for RQ2.

5.4.3.2 The Interviews

The interview sessions enabled the validation and triangulation of each participant's technology dimension profile as discussed above.

5.4.3.3 The Ethnographic Observations

My ethnographic observations of participants enabled triangulation with other data sources to strengthen my findings about each participant's technology dimension profile as discussed above.

5.4.4 The Context Dimension Profile

The context dimension profile of the participants was explored by asking the participants in Focus Group 2 to create a Mandala of themselves in the team. The Mandalas were utilised in the subsequent interviews to prompt the participants to define and make explicit the interconnections with the broader context of the team environment, in support of my ethnographic observations.

5.4.4.1 The Focus Group 2: Mandala

A second, one-hour, team focus group was held on 25 February 2011, when I facilitated the participants to construct a Mandala artwork depicting themselves in the team

to provide insight into their context dimension of KM capacity. The Mandala method consisted of only two instructions to the participants: "Draw a picture (Mandala) of yourself in the team context"; and once completed, "Please describe your Mandala".

The Mandala method is basically an artwork, in a circular form, created by the participant, often around a theme. The Mandala method has previously been applied to an integration of the conscious and the subconscious to gain deeper insight into one's perceptions (Jung, 1965). Since Jung, Mandalas have been applied in the art and psychotherapeutic fields for self-awareness, self-expression, conflict resolution and healing (Bush, 1988; Curry & Kasser, 2005; Kim, Kang, & Kim, 2009; Schrade, Tronsky, & Kaiser, 2011) and to extract valuable information that may have been otherwise blocked by conscious processes (Elkis-Abuhoff, Gaydos, Goldblatt, Chen, & Rose, 2009; Slegelis, 1987). The Mandala's power is derived from its creator explaining/self-analysing what the artwork describes, which is where the creator's subconscious thoughts become more conscious, eliciting deeper perceptions and perspectives.

Further explanations of my first instruction to "Paint a Mandala" were provided to clarify the activity and to assist participants to get started, such as "You can use any colours" or "Keep the artwork within the Mandala circle", and my reiterating "Just paint a picture of yourself in the team". Once the team members understood their task, and were progressing with their Mandala construction, I purposefully distracted their conscious mind by again presenting to the team the combined results of their MBTI assessment (following up from Focus Group 1 on 24 January 2011) in order to validate further and to inform about the RQ1 findings. In this way, their Mandala now became more of a doodle, whereby participants were less consciously focused on the Mandala construction, thus tapping into participants' subconscious views of their KM context. The intention of this Mandala

method was for participants to describe how they saw the team context, extracting issues and perspectives impacting on the internal and external team dynamics, and analysing the team members' Mandalas to reveal the knowledge level contexts with which the team engaged.

Once participants had completed their Mandala, I gave my second instruction to "Describe the Mandala", and they then individually proceeded to present to all focus group participants a brief explanation of the Mandala artwork that they had produced of "them in the team". I occasionally probed with some prompting questions such as "What is the title of your Mandala?", "Are the colours significant?" or "Does that part of it mean anything in particular?"

The participants' self-interpretation and self-analysis of their own Mandala elicited deep, rich qualitative perspectives, reflecting their conscious and subconscious perceptions of the team context and interactions. It was important for the researcher not to judge or to interpret the participants' Mandalas in any way, as it is a Jungian self-analysis method whereby the Mandala creator self-interprets their own Mandala, explaining their subconscious motives behind their design. By self-interpreting their own Mandala, each participant contextualised themselves in the team's place and space and described that contextualisation in their own words.

As a follow-up from Focus Group 2, in the subsequent individual interview sessions the Mandalas were again discussed. In each interview, each participant was provided with an opportunity to clarify further her or his self-analysis, and so the Mandala prompted and facilitated each participant to tap into her or his deeper thoughts and perspectives about the team context. Rather than their interview responses merely being a superficial comment, the Mandala subtly drew the participants into interpreting a succinct, yet deeper, self-

analysis of "them in the team". It was almost as if the Mandala were probing the participant's subconscious perceptions, rather than the interviewer needing to do so verbally.

In retrospect, when the Mandala art from Focus Group 2 was combined with the qualitative interview to complete the analysis, the Mandala method result was a powerful and productive method to obtain a deeper, richer analysis of the participant context dimension. The Mandala method enabled findings about the KM context dimension to be explicitly revealed and comprehended. Each Mandala delved into, drew out and made explicit each participant's unique and diverse subconscious perspective and perception about the team knowledge network context, and it presented that view in an enlightening picture for all to comprehend and compare.

I acknowledge there is a potential lack of accuracy with both the individual and collective Mandala results, however as all Mandalas were self-analysed, this risk is reduced. Therefore, the Mandala depicts indicative visual evidence to suggest the common themes of non-hierarchical structure and collaborative culture in the context dimension, that is further supported by the other data sets. Any risks associated with sharing the individual Mandala perceptions with all members of the group was minimised by having prior informed consent, the collaborative culture of team, and the acknowledgement of the indicative nature of the Mandala results.

It is testament to Jung's (1965) Mandala method that it enabled this research to achieve such deep insights into the participant KM context relationships. Whilst similar insights could have been achieved through other, more direct methods, this study's application further supported the Mandala theory and method for academic research. The Mandala method generated a depth of dialogue and discussion that elucidated the team

dynamics, and this was a positive sign for its credibility. The participants' deep perceptions and interpretations of the team context reinforced the rigour and trustworthiness of this qualitative data collection method and analysis.

5.4.4.2 The Interviews

The interview sessions enabled validation and triangulation of each participant's context dimension profile, as was discussed above.

5.4.4.3 The Ethnographic Observations

My ethnographic observations of participants enabled triangulation with other data sources to strengthen my findings on each participant's context dimension profile, as discussed above.

5.5 The RQ2 Data Collection and Analysis

The analysis of the RQ1 data provided a profile of who and what the team looked like, which was then utilised to inform RQ2. To clarify, RQ1 developed and depicted a profile for each individual participant by combining the various data sets. RQ2 discerned and analysed each participant profile to provide further insight into 'who' the team was and 'how' they constructed KM capacity. Various additional data collection sources were analysed to address RQ2 and how the participants constructed their KM capacity, as was outlined in Tables 1.2 and 5.1.

5.5.1 The Process Dimension Construction of KM Capacity

In order to explore how the team constructed KM capacity in the process dimension, various additional data sources were triangulated with my RQ1 data analysis, including

further interview data and further insights from my ethnographic observations, with all of these data sources being analysed to inform RQ2.

5.5.1.1 The Focus Group 3 Presentation of Findings

The third (and final) focus group was conducted on 12 April 2012, as part of a broader team development day, and involved about 30 minutes of all participants' time. At this stage, all interviews had been completed so Focus Group 3 sought to validate further the consolidated data analysis findings and to discuss the dynamics and diversity within the team to seek any further insight into how the participants constructed their KM capacity dimensions.

To facilitate Focus Group 3, I presented the profiles from the RQ1 data analysis (in Chapter 6), these being the Wordles (see Figure 6.12) for the process dimension, the MBTI string (see Figure 6.24) for the human dimension, office photos (see Figure 6.35) for the technology dimension and the Mandala (see Figure 6.45) for the context dimension. All participants were comfortable and congruent with the presented findings. Thus, this Focus Group 3 validation process increased the credibility of the study and gleaned further insight into the teams' wholistic KM capacity. Also, Focus Group 3 benefitted all participants as a professional development activity by enabling each participant to appreciate the team's KM dimensional diversity, enhancing ongoing team KM capacity and dynamics.

5.5.1.2 The Team Publications

Secondary data in the form of team publications were sourced to inform and provide insight into the team process dimension, including documents related to team processes and reporting, which have been cited (anonymously) throughout this thesis.

5.5.1.3 The Interviews

Further to the interview protocols that were discussed in Section 5.4.1.1, for RQ2 the semi-structured questions of the individual interviews drew on the RQ1 findings to explore further how the participants constructed their KM process dimension capacity, in each of the CISUS processes.

5.5.1.4 The Ethnographic Observations

My ethnographic observations of the participants enabled triangulation with other data sources to strengthen my findings about how each participant constructed KM capacity in the process dimension profile as was shown in Table 5.1.as was discussed in Section 5.4.1.2

5.5.2 The Human Dimension Construction of KM Capacity

In order to explore how the team constructed KM capacity in the human dimension, various additional data sources were triangulated with my RQ1 data analysis, including a third Focus Group, further interview data and further insights from my ethnographic observations, with all of these data sources being analysed to inform RQ2.

5.5.2.1 The Focus Group 3 Presentation of Findings

As is discussed in Section 5.5.1.1, during Focus Group 3 the combined MBTI results (human dimension) were again presented to the team, seeking further validation and further discussion of the dynamics and diversity of the team KM capacity construction across the human dimension.

5.5.2.2 The MBTI of Team and Organisation

I extended the application of the MBTI Form M instrument somewhat in order to obtain further data to triangulate with my own ethnographic observations for further insight into the participant human dimension. Consequently, participants were asked what they thought that the desired MBTI preference of the team and organisation was. Participants then filled in the MBTI form M, answering each question "according to what you think that the team/organisation would prefer you to do". That is, rather than answering the MBTI based on their own preference, the participants answered the form based on their subjective perceptions of "what and how" that they thought the team/organisation would ideally prefer. Whilst this was an extension of the practitioner application of the MBTI diagnostic instrument, it was pursued in order to provide a supplementary data source to support my own observations as to the overarching MBTI persona of the team and the organisation within which the participants were working.

This technique adapted the MBTI process to "project" the participants' perceptions of what the team/organisation's preference was. The technique was utilised because I was not aware of any other available way to obtain a perception of the "team/organisational MBTI ideals", as neither entity had the self-awareness to complete the MBTI process itself. Seeking senior executives' views would also be similarly subjective and would also have necessitated broadening my ethics approval scope. This was a non-standard application of the Form M however, I contend that the team personality was what the participants wanted it to be, and that the participants were quite able, familiar and conversant to "profile" their own team MBTI preference. This innovative application of the MBTI sufficed to generate indicative insight for the purpose of triangulating with my own ethnographic observations into the human dimension dynamics of the team/organisation C-Z context levels within

which the participants were interacting. Given that the individuals perceived that the team and the organisation had particular MBTI preferences, this method of analysis was considered an ethical adaptation of MBTI to provide a form of triangulation to support my ethnographic observations of the MBTI of the team/organisation.

5.5.2.3 The Team Publications

Secondary data in the form of team publications were sourced to inform and provide insight into the team human dimension, including documents discussing team membership and structure, which have been cited (anonymously) throughout this thesis.

5.5.2.4 The Interviews

Further to the interview protocols discussed in Section 5.4.1.3, for RQ2 the semi-structured questions of the individual interviews drew on the RQ1 findings to explore further how the human dimension influenced the participants to construct their KM capacity as was shown in Table 5.1 and as was discussed in Section 5.4.1.1.

5.5.2.5 The Ethnographic Observations

My ethnographic observations of participants enabled triangulation with other data sources to strengthen my findings about how the human dimension influenced each participant to construct KM capacity as was shown in Table 5.1 and as was discussed in Section 5.4.1.2.

5.5.3 The Technology Dimension Construction of KM Capacity

In order to explore how the team constructed KM capacity in the technology dimension, various additional data sources were triangulated with my RQ1 data analysis,

including results from an ICT survey, further interview data, and further insights from my ethnographic observations, with all of these data sources being analysed to inform RQ2.

5.5.3.1 The Focus Group 3 Presentation of Findings

During the third focus group I again presented the combined office photographs (technology dimension) to the team, seeking further validation and additional discussion of the dynamics and diversity of the team KM capacity construction across the technology dimension.

5.5.3.2 The ICT Survey

Another survey was designed as part of this study, as was discussed in Section 5.4.1.3.1, which gathered descriptive data about each individual participant's KM technology dimension capacity by exploring specific aspects of their ICT skill and use as was mentioned in the Chapter 2 literature review. The deployed ICT survey appears in Appendix M and required approximately one hour of participants' time to complete. The insights from this ICT survey analysis were triangulated with the other data sources to strengthen my study findings into the participants' engagement with the KM capacity technology dimension to inform the RQ2 and RQ3 analysis in Chapters 7 and 8 respectively.

5.5.3.3 The Team Publications

Secondary data in the form of team publications were sourced to inform and provide insight into the team technology dimension, including documents relating to team technological developments, insights and issues, which have been cited (anonymously) throughout this thesis.

5.5.3.4 The Interviews

Further to the interview protocols discussed in Section 5.4.1.1, for RQ2 the semi-structured questions of the individual interviews drew on the RQ1 findings to explore further how the technology dimension influenced participants to construct their KM capacity. Each participant was prompted to explain further, in order to triangulate the findings about their technology engagement with the office photos, the ICT survey and the ethnographic observational data sources.

5.5.3.5 The Ethnographic Observations

My ethnographic observations of participants enabled triangulation with other data sources to strengthen my findings about how the technology dimension influenced the participants to construct their KM capacity as is discussed in Section 5.4.1.2 and as was shown in Table 5.1. My ethnographic observations of participants' technology skill and use were triangulated with the other data, such as the office photographs and the ICT surveys, to reflect on the KM technologies being professionally utilised by each participant.

5.5.4 The Context Dimension Construction of KM Capacity

To explore how the context dimension influenced participants' construction of KM capacity, I sought to obtain a detailed description of the context in the analysis of the data (Creswell, 2009). Various additional data sources were triangulated with my RQ1 data analysis, including further analysis of the descriptive Mandala artwork developed by participants in Focus Group 2, an analysis of the MBTI context of the team and organisation, team publications, further interview data and further insights from my ethnographic observations, with all of these data sources being analysed to inform RQ2.

5.5.4.1 The Focus Group 3

During Focus Group 3, I again presented the combined Mandalas (context dimension) to the team, seeking further validation and additional discussion of the dynamics and diversity of the team KM capacity construction across the context dimension.

5.5.4.2 The Mandala

The Mandala data sources are further analysed and discussed in Chapter 7 to enable insights into the participants' engagement with the various C-Z levels of the context to construct their KM capacity.

5.5.4.3 The Team Publications

Secondary data in the form of team publications were sourced to inform and provide insight into the team context, including documents such as team publications and university planning documents, which have been cited (anonymously) throughout this thesis.

5.5.4.4 The Interviews

Further to the interview protocols discussed in Section 5.4.1.3, for RQ2 the semi-structured questions of the individual interviews drew on the RQ1 findings to explore further how the context dimension influenced participants to construct their KM capacity as was shown in Table 5.1 and as was discussed in Section 5.4.1.1.

5.5.4.5 The Ethnographic Observations

My ethnographic observations of the participants enabled triangulation with other data sources to strengthen my findings about how the context dimension influenced each participant to construct their KM capacity, as was shown in Table 5.1 and as was discussed in Section 5.4.1.2. My ethnographic observations, enabled by being at the team meetings,

triangulated with other data sources to enable deeper insight into the KM capacity context dimension of the team, particularly regarding the team's maturity and culture.

5.6 The RQ3 Data Collection and Analysis

The analysis of RQ1 data provided a profile of *what* the participants KM capacity profile looked like, which then informed RQ2 about *how* the participants constructed their KM capacity, and together the RQ1 and RQ2 findings informed the RQ3 analysis of *why* the team constructed their KM capacity. The RQ3 data analysis considered data source evidence, was outlined in Tables 1.2 and 5.1, to explore *why* the team constructed KM capacity in relation to Bourdieu's (1986) forms of economic, cultural and social forms of capital.

5.6.1 The KM Capacity Relationship with Capital

All data sources analysed for RQ1 and RQ2 pertaining to the KM capacity process dimension were reflected on to inform about the team relationship with the different forms of capital. In particular, the RQ3 analysis was progressively and iteratively informed through and triangulated with analysis of all data sources, drawing on the iterative, ongoing reflection on my ethnographic observations and the interviews, as was shown in Table 5.1, and as is discussed below. All four KM capacity dimensions were thematically analysed in their relationship with the selected forms of capital to identify emerging themes and to strengthen my findings about the individual and collective relationship between the construction of KM capacity and forms of capital. In particular, the data sources of the ethnographic observations, publications, and interviews are considered further below.

5.6.1.1 The Ethnographic Observations

As the study proceeded, my collected ethnographic observational data were analysed to address RQ3. The ongoing, critical reflection and insights from my ethnographic observations became richer, and were instrumental in my exploratory study emergently evolving, midway through as I "joined the dots" between *how* the team constructed their KM capacity (RQ2) and *why* they did it like that (RQ3).

The early analysis of the ethnographic observations for RQ3 resulted in my realisation that the team was, in an implicit way, engaging with the different forms of capital, and this was a finding in itself. That is, the progressive RQ3 analysis of ethnographic observations led to the insight that one of the main "why's" motivating participants in this team to construct KM capacity in the process dimension was so that they could engage with the different forms of capital.

Consequently, literature was sourced to support this KM-capital relationship, and the study conceptual framework broadened to become Figure 3.5. RQ3 was thus adapted to focus specifically on the different forms of capital that the team constructed. The refined RQ3 sought to elicit this KM capacity-capital relationship, and the analysis of my later ethnographic observations of the team provided further insight by contemplating Bourdieu's (1986) forms of capital in this study context. In this way, the analysis of the RQ3 process dimension drew on the iterative, ongoing reflection of my ethnographic observations, triangulated with the team publications, feedback on my own presentations and publications, and the interviews.

5.6.1.2 Publications

Secondary data in the form of team publications were sourced to provide insight into the team KM capacity (in the process dimension) and its relationship with the different forms of capital. Examples include formal academic publications and presentations, research grant applications, team reports, promotions and salaries, and awards and prizes – all of which have been cited (anonymously) throughout the thesis.

Also a number of publications were developed by myself over the course of my PhD candidature discussing data analysis and insights relating to this research, as was highlighted within the thesis front section called "Selected publications and presentations related to this study". All participants were enabled to engage with these publications and to make comment, which provided further validation of the study data collection and analysis process.

Importantly, two of my three PhD supervisors were familiar with the case study site team, and so their review of my publications was a significant additional validation of my findings. Furthermore, my publications and presentations engaged a broader peer review process, whether through audience feedback or from formal peer review critique. Any relevant peer/audience feedback has been addressed and incorporated into this thesis. Therefore, the publication process provided an opportunity for me to engage with participants and peers and thereby to enable critical feedback about the findings of this study, particularly regarding the relationship between KM capacity (in the process dimension) and the different forms of capital to validate further and to strengthen my research outcomes, and to experience personally (ethnographically) the KM capacity-capital relationship as an outcome of my own publication outputs.

5.6.1.3 The Interviews

Further to the interview protocols discussed in Section 5.4.1.1, for RQ3 the semi-structured questions of the individual interviews sought to explore further the relationship between the KM capacity dimensions and the different forms of capital.

5.7 The Strength and Rigour of the Data Collection and Analysis Procedure

The data collection and analysis techniques utilised in this study, as were discussed in Sections 5.4, 5.5 and 5.6, drew on a number of data sources being analysed, as was shown in Table 5.1, which together provided evidence to enable the RQs to be rigorously addressed. In Section 4.8, the strengths and rigour of this study design were highlighted, addressing the credibility, dependability, confirmability and transferability to support the philosophical trustworthiness of this thesis. In this section, additional explanation of the rigorous data collection and analysis procedure is provided, through detailing the thematic analysis, data triangulation and rich description techniques, to further support this thesis.

The combination of multiple methodological practices, empirical materials, perspectives and observers in a single study is a strategy that adds rigour, breadth, complexity, richness and depth to any inquiry (Flick, 2008, 2013). Ethnographic case study researchers can utilise a variety of desktop and field research methods of data collection, such as semi-structured interviews, focus groups and observations (Fife, 2005; O'Reilly, 2005), and also document analysis, descriptive surveys, participant observations and artifact analysis (Denzin & Lincoln, 2011; Lincoln & Guba, 1985; Merriam, 1998). Different research purposes require different research designs and analysis techniques (Knafl & Howard, 1984).

For my qualitative, ethnographic case study, I sought to interpret and compare various spoken, written and visual evidence related to the team KM capacity dimensions "to make statements about the dimensions and structures in the material and what is represented in it" (Flick, 2013, p. 5). In this study, I analysed multiple data sources to obtain perspectives on the four dimensions of KM capacity and Bourdieu's (1986) forms of capital. My data sources included focus groups and interviews (spoken evidence), ethnographic observations (visual evidence), and descriptive surveys and team publications (written evidence). These multiple sources enabled data triangulation (Denzin, 2012) to enhance the credibility and rigour of the study (Flick, 2013), as was discussed in Chapter 4. The analysis of all data sources was explained in Sections 5.4 to 5.6 in relation to which RQs the data sources were addressing.

In this study's case study design, each participant was considered a unit of analysis, as the participant was the actual source of information (Yin, 2013) for each of the KM dimensions. This enabled the collection and analysis of each participant's KM capacity from the RQ1 data sources to provide an overall profile of the wholistic KM capacity, and consideration of the similarities and differences between each individual's capacity and the broader group's KM capacity.

I acknowledge that the individual data sets within each RQ lack absolute robust evidence in their own right. However, all data sets in combination did offer rigorous and robust empirical evidence of indicative artefacts and worked well together as contemporary illustrations that enabled me to profile the participants across the four KM capacity dimensions. For example, each RQ1 data set provided a particular description of participants, and when analysed in combination, by triangulating the surveys, wordle, demographics, MBTI, office photos, Mandala, interviews and observations, provided a rich

team profile. Similarly, this combinatory, triangulation approach applies for the data sets of RQ2 and RQ3. This resulting individual and team profile and KM insight played a vital role in shaping the formation of my thoughts and aided my ongoing theorising and conceptualising of how and why this team constructed KM capacity within this case study and context.

For the analysis of these collected data, the overarching data analysis techniques were thematic, triangulation and rich description. These analysis techniques enabled the study's research strength and rigour to be established within the research paradigm to address the RQs, generate a more comprehensive understanding of the nature of contemporary KM and elicit insights into the research problem.

5.7.1 The Thematic Analysis Techniques

Qualitative thematic analysis is one of numerous research methods used to analyse text data. Thematic analysis enables researchers to identify numerous cross-references among the data to develop the research's evolving themes (Alhojailan, 2012). Creating and adhering to an analytical procedure or a coding scheme will increase the trustworthiness and rigour of the study, and other methods include ethnographic and content analysis (Hsieh & Shannon, 2005). Thematic analysis is a poorly demarcated, rarely acknowledged, yet widely used qualitative analytic method within psychology (Braun & Clarke, 2006).

For my thematic analysis, the units of data (individual participant results) were coded, and the principle of saturation was used to ensure credibility and to provide insight into the construction of KM capacity. The data collected from the surveys, focus groups, interviews, secondary sources and ethnographic observations were analysed qualitatively according to the KM capacity dimension themes identified in my conceptual framework, the KM

capacity-capital architecture presented in Figure 3.5. The coding process generated further description of the context (Creswell, 2009), as well as being used to generate "patterns, categories or themes for inductive analysis" (Patton, 2002, p. 454). The general categories that were significant in this study were established to respond to the RQs in Chapter 3- i.e., the KM capacity dimensions (process, human, technology and context) and forms of capital (economic, cultural and social). This study's subdimensions/subcategories formed around the data sources (such as the MBTI preferences in the human dimension). Within these general categories and subcategories some themes emerged (Merriam, 1998).

To assist with this thematic analysis, descriptive information about the participants was displayed in a table (Creswell, 2009), particularly the demographic data. Furthermore, cross-participant analysis of data for themes and issues (Creswell, 2009) was undertaken to seek similarities and differences between how each participant engaged with the KM capacity dimensions. Data analysis involved interpreting the data in relation to personal insights and comparing the findings with past literature and theory (Creswell, 2009), by linking back to the Chapter 2 literature review and Chapter 3 conceptual framework. The themes that emerged from the RQ1 analysis were further explored in RQ2 and RQ3 to gain further insight into and interpretation of the findings.

5.7.2 The Data Triangulation Techniques

As was noted in Chapter 4, various data collection sources were utilised as part of this case study, including surveys, semi-structured interviews, focus groups, secondary documentation and ethnographic observations. The subsequent analysis of each data source generated qualitative insights that informed the analysis of other data sources across all three RQs for a triangulation effect. For example, as was shown in Table 5.1, the data

related to RQ1 *who and what* questions – that is, the diagnostic surveys, interviews and ethnographic observations – were analysed to answer RQ1. Additional data from the interviews and observations were triangulated with the RQ1 insights to answer RQ2 in relation to the conceptual framework.

The insights from RQ1 and RQ2 were further developed by my broader ethnographic observations of the research team in the field and the team publications to inform my response to RQ3. The iterative triangulation of analysis enabled this study to explore empirically each of the KM capacity dimensions, and their relationship with the different forms of capital, as was conceptualised at Figure 3.5.

To facilitate this triangulation effect, I started analysing each data source as soon as it was collected to build my understandings of the case, and so my research design could then also be adapted as required. Analysing data concurrently, as soon as they have been collected, "allows the data gathering process to be data driven" (Richards & Morse, 2007, p. 153). The analysis results were used to make multiple types of inferences that were pulled together at the end of the study in the form of "global inferences" (Tashakkori & Teddlie, 2003, p. 712). Making meaning from the data, or determining "what were the lessons learned" (Lincoln & Guba, 1985, as cited by Creswell, 2003, p. 194), was the final step in the data analysis. The global inferences and meaning making arising from this study are discussed in Chapters 6, 7 and 8.

5.7.3 The Rich Description Techniques

As was discussed in Chapter 4, the findings of this study have been presented in descriptive, narrative form and rich, thick description has been used to convey the findings (Creswell, 2003, p. 196) and to provide a wholistic view of the case. Rich, thick description

has also assisted in checking the accuracy of the findings (Creswell, 2003, p. 196) and in allowing the reader to transfer information and findings to other settings owing to "shared characteristics" (Erlandson et al, 1993, as cited by Creswell, 1998, p. 203). The rich descriptions of the themes and relationships within the data of this study informed the conclusions regarding the construction of KM capacity.

Each data analysis chapter (6, 7 and 8) also provides thick, rich descriptions of my reflexive and retrospective reflections on gathering the data in the role of a participating ethnographic researcher, and in the overall analysis process. I was aware that my research closeness did not make bias and the loss of perspective inevitable (Patton, 2002, p. 49), so I maximised my reflexivity by undertaking an ongoing examination of "what I know and how I know it" (Patton, 2002, p. 46), and I engaged in triangulated reflexive inquiry through journaling, and noting rich description in my ethnographic observations.

Finally, using rich descriptions to explain the data collection and analysis strategies and methods serves to strengthen and support the credibility of research (LeCompte et al., 1993; LeCompte & Schensul, 1999). The rich descriptions included in this thesis detail the study's context, its conceptual framework, and its research design and credibility aspects, thus supporting its academic claims (Lincoln & Guba, 1985; Merriam, 1998). Also the data analysis chapters (6, 7 and 8) interweave rich descriptions to support reflections on my critical experiences as a participating ethnographic researcher to address each of the three RQs.

5.8 **Conclusions**

The above section provided an overview of considerations influencing the research design to collect and analyse the data of a qualitative, ethnographic case study in order to

answer the three RQs of this study and to expand theoretical knowledge to assist in resolving the identified, significant literature gaps. This included a consideration of the thematic analysis of various qualitative data sources that were linked for triangulation across my study RQs, as was shown in Table 5.1.

The data collection and analysis design aspects formed the core of this study to deliver strong and rigorous results, and the logical structure of my approach enabled me to collect and analyse data sequentially and methodologically to address all four dimensions of KM capacity, with the granularity of particular subdimensions, so as to enable a qualitative assessment of the KM capacity attributes of the case study team. The research design of this study was clearly bounded to generate data that were analysed in this structured approach to enable me to deliver defensible answers to my RQs and to generate substantial contributions to the body of knowledge pertaining to the construction of KM capacity within a team and their relationship with Bourdieu's (1986) forms of capital.

In the thesis data analysis chapters, I address the KM capacity dimensions in the consistent order of process, human, technology and context, and I continue this consistent sequence for presenting the participant data, in order to enhance readability. The data analysis for RQs1, 2 and 3 is presented in Chapters 6, 7 and 8 respectively, with reference to the literature reviewed in Chapter 2, the conceptual framework presented in Chapter 3, the research philosophy discussed in Chapter 4 and the research design detailed in this Chapter 5.

6. RQ1 DATA ANALYSIS: KM CAPACITY PROFILES OF PARTICIPANTS

6.1 Introduction

Chapter 4 described the research design for this study, and Chapter 5 detailed the data collection and analysis techniques deployed in this study. This chapter discusses the analysis of the collected data sources to address RQ1, which asked "*What was the KM capacity profile of the research team and its members?*" In this chapter an overall KM capacity profile of the team and its participants is developed, by combining all participant profiles from each of the four KM dimensions (process, human, technology and context), which were the findings of an analysis of the multiple data sources summarised in Table 5.1. This chapter therefore presents descriptive data to provide an evidence-based profile of who the participants were, in order to address RQ1. Thus, when all participant profiles from the four dimensions are considered wholistically, they provide an overall, four-dimensional profile of KM capacity that answers RQ1. These RQ1 findings inform and influenced my thoughts regarding the RQ2 data analysis in Chapter 7 and the RQ3 analysis in Chapter 8.

6.2 The Structure of This Chapter

This chapter has four sections (6.3 to 6.6) that correspond with the analysis of the selected data sources to provide a participant profile in relation to each of the four KM capacity dimensions (process, human, technology and context). Further discussion of the RQ1 data analysis findings is presented in Section 6.7, leading to the conclusion in Section 6.8.

6.3 The Process Dimension Profile

To obtain a KM capacity process dimension profile of individual participants and the team, the CISUS survey and the Wordle data sources were analysed, as was discussed in the research design in Section 5.4.1 and summarised in Table 5.1. These participant process profiles were then further validated in the individual interviews and by my ethnographic observations. The findings of this analysis are presented below.

6.3.1 The CISUS Survey Profile

The CISUS survey as shown in Appendix K was deployed, and the compiled team results of the data analysis appear in Table 6.1. These survey results indicate the create, improve, store, use and share (CISUS) KM process activity that each participant was conducing to construct KM process dimension capacity during her or his 2011 engagement with the research team.

Table 6.1: Participant CISUS Activity Survey Results

In 2011,	*Month*	*Week*	*Day*	*Hour*
I ***Created**** some knowledge for ***My Personal*** benefit, every:	E,P,W	D	L,O	
I ***Created*** some knowledge for ***Research Team*** benefit, every:	L,P,W,D		E,O	
I ***Improved**** some knowledge for ***My Personal*** benefit, every:		L,W,D	E,P,O	
I ***Improved*** some knowledge for ***Research Team*** benefit, every:	L,E,D	P,W	O	
I ***Stored**** some knowledge for ***My Personal*** benefit, every:			L,P,O,W,D	E
I ***Stored*** some knowledge for ***Research Team*** benefit, every:		L,E,P,D	O,W	
I ***Used**** some knowledge for ***My Personal*** benefit, every:			O,W,D	L,E,P
I ***Used*** some knowledge for ***Research Team*** benefit, every:		L,E,D	P,O,W	
I ***Shared**** some knowledge for ***My Personal*** benefit, every:		W,D	E,O	L,P
I ***Shared*** some knowledge for ***Research Team*** benefit, every:	L,D	E,W	P,O	

Table 6.1 provides descriptive evidence of participants' CISUS activity, with reference to their pseudonym codes from Appendix G. The results from Marge, Kandy and Ruby were not available; however, my ethnographic observations suggested that their results would be similar to those of the other participants.

The first insight to draw from these survey data is that all the participants reported managing their respective knowledge with significant activity in all of the CISUS processes, for both personal and team benefit. This insight from the survey data provided further triangulating evidence to support my ethnographic observations of the participants' KM process dimension profile, in that they were all very actively processing knowledge. The *how and why* influencing participants' KM capacity process dimension activity is discussed in RQ2 and RQ3.

Another point of interest from the survey data was the variation on how the participants perceived their CISUS process activity. Some participants described engaging in CISUS processes on a daily basis, whereas for others it was monthly. In terms of profiling each participant on her or his KM capacity process dimension, this survey revealed that overall the team was quite active in all CISUS processes, yet individual participants processed their knowledge at their own particular rates.

Also, the *team* CISUS process activity occurred on a slower (weekly-monthly) cycle, compared with the faster (daily-weekly) cycle for *personal* KM. This finding can be explained by the team activities being secondary to the participants' personal university tasks, and because the team met only monthly. However, my observations suggested that the team KM processes may have been on a slower cycle, yet they were *stronger*. For example, words to the effect that "The team was more than the sum of its parts" were repeated in several participant interviews. My observations suggested that the slower,

stronger, combined team KM processing effect generated a greater KM capacity than the individuals could have achieved had they worked alone. *How* the team did this is explored in Chapter 7, where specific data about how each participant engaged with these CISUS processes to construct her or his KM capacity are analysed. These CISUS survey data thus revealed a KM capacity process dimension profile of participants' CISUS activity.

6.3.2 The Wordle Profile

The Wordle explored what specialist knowledge was being processed by the participants. The next subsections provide a description of the publication data analysed to form each participant's Wordle, followed by a discussion of that analysis.

6.3.2.1 Publications Analysed

The Wordles were compiled from secondary data listed in a document produced by the team for the Faculty administration (Case Study Team, 2011a). This secondary data list detailed each individual participant's A1, B1, C1 (sole and co-authoured) publication titles over the period 1 January 2005 to 31 December 2010 (the period of the second Excellence for Research in Australia audit). The total number of publications, by category, was as shown in Table 6.2.

Table 6.2: Participant Publications 2005-2010

Publication Type	DEEWR publication category	Total Number
Authored research books	A1	4
Chapters in research books	B1	36
Refereed research journal articles	C1	39
Refereed research conference publications	E1	38
Edited research books		5
Edited journal refereed theme issues		5
Unpublished PhD thesis		3
Conference and seminar presentations		78

Table 6.2 shows that participants had produced a total of 208 publications over six years from 2005-2010, which provided a reasonable data set to reveal their knowledge specialisation. In developing the Wordles, I acknowledge that my use of participant publication titles dated prior to 2010 preceded my data collection period; however, in the interests of profiling each participant, such secondary data were considered appropriate to analyse and did not complicate my ethics approvals as this data was available and sourced from within the public domain. Therefore any ethical risks associated with analysing all this available data was considered minimal.

The publication titles of each individual were extracted, and a Wordle was compiled to generate an indicative picture of the participant's research and knowledge interests (Matthews & Danaher, 2015). The Wordle thus provided an efficient, evidence-based method to gather insights into the participant's knowledge specialisation, and to present a profile of the knowledge the participants had created, improved, stored, used and shared in constructing their publication history. The resulting KM process Wordles are presented and discussed below, with Figures 6.1 to 6.9 corresponding to each of the nine participants.

The Wordles were validated by the participants in their individual interviews, all agreeing that the Wordle provided a reasonable picture of their current knowledge interests. Most participants elaborated further and reflected on their knowledge specialisation. These Wordles were also presented to the participants in Focus Group 3 on 12 April 2012, providing participants with the opportunity to discuss their respective Wordle further and to seek feedback. This also enabled participants to visualise and contrast their own knowledge specialisation alongside that of others in the team.

6.3.2.2 Lucy

Figure 6.1 Wordle for Lucy

The Figure 6.1 Wordle reveals that the focal knowledges being CISUS managed by Lucy were in the KM capacity-building aspects of research, blended-learning, collaboration, education and case-study. In the interview, Lucy refined and validated her Wordle, commenting "I think 'blended' and 'learning' is hyphenated, so it is actually 'blended-learning'. However, apart from that minor point, the Wordle looks pretty good as

a picture of my research focus". In this way, the Wordle prompted an evidence-based profile of the knowledge specialisation that Lucy was CISUS processing.

6.3.2.3 Emma

Figure 6.2 Wordle for Emma

The Figure 6.2 Wordle for Emma reveals an interest in the KM capacity-building aspects of education, research, community, transforming, training and learning. In her interview, Emma considered the words "education" and "research" to be more reflective and pedestrian, whereas the lesser used words such as "engagement", "leadership" and "collaborative" were there for more meaningful reasons. This suggested that an analysis of the top 10 or 20 words might reveal further insights into the knowledge being processed. However, my analysis aimed to distil only the top three words, as these were most used in the publication titles and thus framed and profiled the participant knowledge being processed.

6.3.2.4 Paul

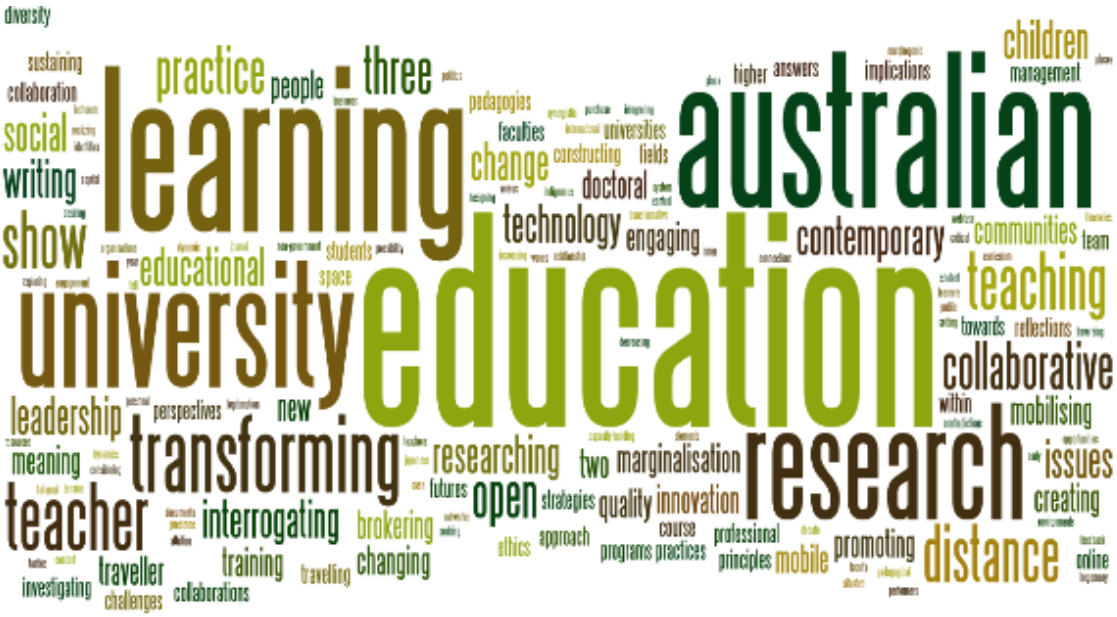

Figure 6.3 Wordle for Paul

The Figure 6.3 Wordle for Paul reveals his specialisation in the KM capacity-building aspects of education, Australian, learning, university, research, and transforming. Paul's substantial publication list visually highlights the variety of knowledge that Paul was CISUS processing. Paul acknowledged his Wordle words as "appropriate". However, Paul then identified that "my top word would be 'mobility', which does appear, but in the form of 'mobile' and 'mobilising'".

Paul's case highlights two things. Firstly, it suggests that a wordle on the publication *abstract* may provide greater insight on the knowledge being processed, and words such as "mobile" may have increased in size. Secondly, it shows how the wordle "prompt" achieved its purpose. That is, in less than four minutes of interview discussion, it had stimulated deep, rich, evidence-based insight into the knowledge that Paul was processing. Both of these points are methodological findings, supporting further use of the "Wordle on publication titles" to provide a profile of participant KM process dimension capacity.

6.3.2.5 Wal

Figure 6.4 Wordle for Wal

The Figure 6.4 Wordle for Wal reveals his focus on the KM capacity-building aspects of research, collaboration and sustaining. Wal explained this by stating "My focus is interdisciplinary as I've found most success in seeing connections and pulling those things together to create new ways of looking at things".

6.3.2.6 Owen

Figure 6.5 Wordle for Owen

The Figure 6.5 Wordle for Owen shows his interest in the KM capacity-building aspects of education, research, collaboration, learning and mapping. Owen also mentioned that his more recent focus was "On workplace learning and andragogy, or adult learning principles". However, as he was yet to publish formally much on that topic, the Wordle did not reflect it. Thus, whilst the Wordle provided only a back-dated knowledge snapshot, it was evidently useful to prompt interview discussions.

6.3.2.7 Ruby

Figure 6.6 Wordle for Ruby

The Figure 6.6 Wordle for Ruby highlights her knowledge specialisation in the KM capacity-building aspects of research, learning, literacy, students and collaboration. Ruby validated that the Wordle was representative; however, she stated "I'm actually moving into adult literacy" as her new research focus. So again, as with Owen, the Wordle provided a more retrospective profile of the knowledge Ruby was processing but prompted the interview insights.

6.3.2.8 Marge

Figure 7: Intentionally Blank

Figure 6.7 Wordle for Marge

A Wordle for Marge was not compiled, as she was yet to publish formally. However, to maintain the numbering and structural consistency for the presentation of each participant's data with the rest of this thesis, an intentionally blank figure has been inserted here.

6.3.2.9 Kandy

Figure 6.8 Wordle for Kandy

The Figure 6.8 Wordle for Kandy reveals her focus on the KM capacity building aspects of research, education, early-childhood, choice and understanding. In her interview Kandy agreed that the Wordle "definitely" represented her knowledge focus. She clarified that "Once upon a time early childhood would be as big as the others, but not now", indicating that, like Owen and Ruby, her knowledge focus had also changed, but that the Wordle reflected this because she had published accordingly.

6.3.2.10 Dave

Figure 6.9 Wordle for Dave

The Figure 6.9 Wordle for Dave reveals the knowledge he was processing was related to the KM capacity-building aspects of KM, research, assets and reimagining. Dave subsequently validated his Wordle with the view that KM was his core knowledge specialisation, which he applied to different contexts.

6.3.2.11 All Participants' Wordles

All participants' Wordles were combined onto one page, as is shown in Figure 6.10, revealing the subtle subject focus differences between each participant's Wordle related to their respective knowledge specialisations. This finding was supported by my ethnographic observations, in that whilst each participant was knowledgeable in many areas, all had developed various "knowledge niche" specialisations and expertise.

This combined Wordle data analysis summary has previously been presented at two conferences (Matthews, 2011, 2013a) to seek peer review feedback about the diagnostic

use of the Wordle algorithm for data analysis. Audiences were quite interested in this data analysis technique, and one comment was that the Wordle did indeed produce a striking image of the participants' knowledge specialisation. Also Figure 6.10 was presented for further participant validation in Focus Group 3, where the team endorsed the various knowledge specialisations of each participant.

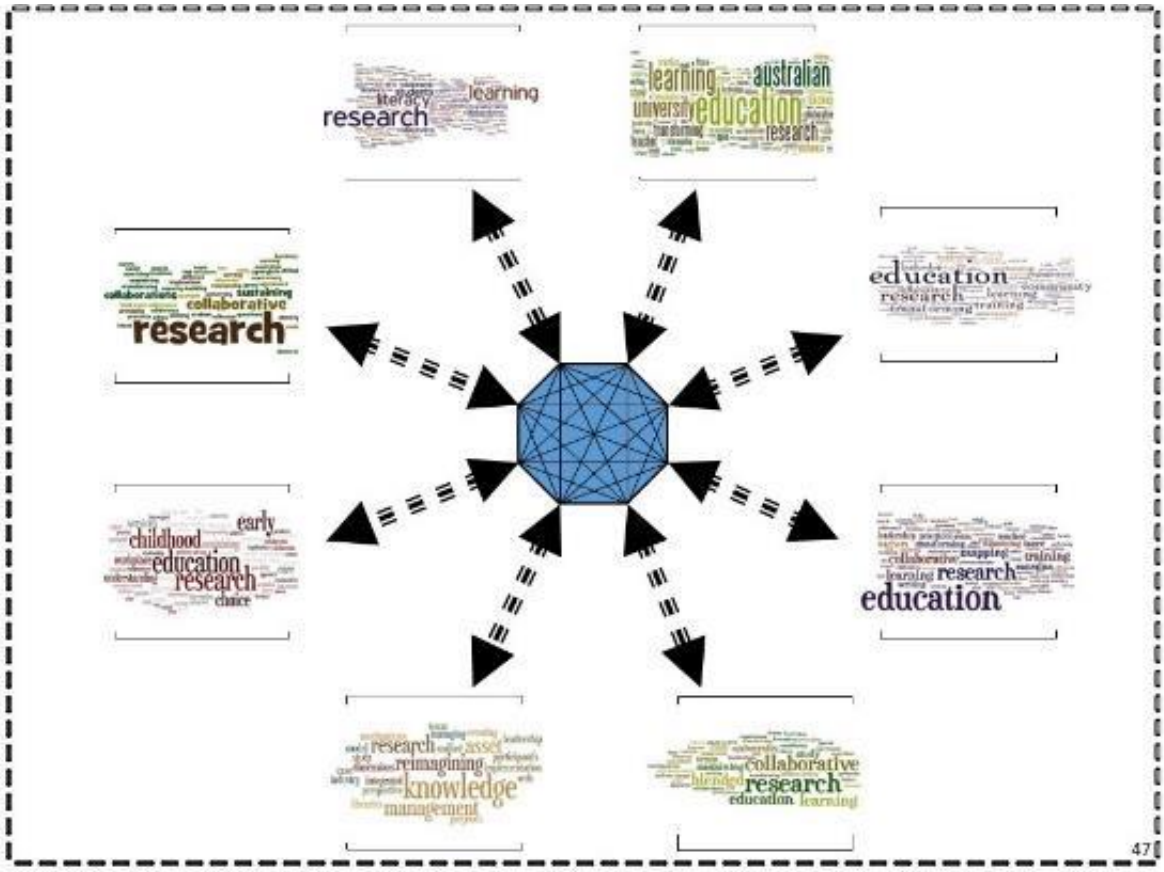

Figure 6.10 All Participants' Wordles

One point to note from Figure 6.10 was that when the Wordle analysis was triangulated with the demographic survey results (from Section 6.4.1), it revealed that, whilst all nine participants reported that they were processing knowledge in the education

discipline, there was a deeper level diversity, and multidisciplinary aspect, with each participant processing knowledge related to a particular knowledge specialisation.

Another process dimension insight gleaned from Figure 6.10 was that it visually highlights the top three words used by each participant in their publications, thereby providing a summary of their knowledge specialisation being CISUS processed within the overall team. Extracting the top three words from each participant's Wordle produced the matrix shown in Table 6.3.

Table 6.3: Team Knowledge Specialisation

Participant	1st most used word	2nd most used word	3rd most used word
Lucy	Research	Collaboration	Learning
Emma	Education	Research	Transforming
Paul	Education	Learning	Australian
Wal	Research	Collaboration	Sustaining
Owen	Research	Learning	Training
Ruby	Research	Learning	Literacy
Marge	-	-	-
Kandy	Education	Research	Early-Childhood
Dave	Knowledge	Management	Research

Table 6.3's participant knowledge specialisations can be distilled further by removing duplicate words to show 12 keywords, these being: Research, Collaboration, Learning, Education, Transforming, Australian, Sustaining, Training, Literacy, Early-Childhood, Knowledge and Management.

In an advertising pamphlet, the team described their knowledge specialisation as encompassing "sustainable and innovative practices, learning and development, lifelong learning and the development of self-determined communities" (Case-Study-Team, 2011, p. 1). The Wordle analysis of participants' publication titles has distilled evidence to support and extend this advertising pamphlet's claim with regards to the team's knowledge specialisation.

My triangulated ethnographic observations supported these findings about the individual and team knowledge specialisations. Also, during team meetings, I observed the team discussing KM projects such as attending and organising conferences, publishing books and papers, and exploring industry capacity-building research opportunities. These discussions were more broadly related to education research and aligned with the 12 keywords distilled from the Wordle analysis.

6.3.2.12 Combined Team Profile

As a final process dimension analysis, a combined team Wordle was developed, based on the consolidated research team's A, B and C publication titles as at 31 December 2010, as is presented in Figure 6.11.

Figure 6.11 Team Wordle

Figure 6.11 shows that the overall team knowledge specialisation can be distilled by taking the top three words, “education”, “research” and “learning”, which form a succinct profile of the knowledge that the overall team was CISUS processing, with each participant having his or her particular specialist niche within this total team knowledge being processed. The KM implications of how the team managed its knowledge is contemplated further in Chapter 7 as part of the RQ2 analysis.

6.3.3 Conclusions about the Process Dimension

The CISUS survey provided a descriptive instrument to gather indicative insights into the knowledge specialisations that participants were processing and publishing, and therefore reveal the create, improve, store, use and share (CISUS) activity profile discussed in Section 6.3.1. The Wordle analysis provided an evidence-based prompt that was

validated by participants in the subsequent interviews to reveal the knowledge specialisations participants were processing. Thus, the Wordle provides a KM capacity process dimension profile of participant knowledge specialisation. The CISUS activity profile, and the Wordle profile of knowledge being processed, combine to reveal an overall profile of the KM capacity process dimension.

6.4 The Human Dimension Profile

As was discussed in the research design in Section 5.4.2 and summarised in Table 5.1, the demographic survey data and the MBTI instrument data were analysed to obtain a human dimension profile of participants, with each profile being validated further in the interviews and by my ethnographic observations. The findings of this analysis are presented below to provide a KM capacity human dimension profile of the participants and the team.

6.4.1 The Demographic Profile

This subsection analyses the demographic survey data source to deliver a demographic profile of each member of the team.

6.4.1.1 Demographics

The demographic survey instrument (Appendix L) was deployed, and all participants returned results. The data gathered were tabulated, as is shown in Table 6.4, which provides a snapshot of the team's demographic profile. This demographic profile evidence was supported by triangulation with secondary data sources such as team publications as well as with my ethnographic observations.

Table 6.4: The Participant Demographic Profile of the Team in 2011

Psudonym	Lucy	Emma	Paul	Wal	Owen	Ruby	Marge	Kandy	Dave
Gender	Female	Female	Male	Male	Male	Female	Female	Female	Male
Age Group (in 2011)	38-59	38-59	38-59	38-59	38-59	38-59	38-59	38-59	38-59
Country lived in during childhood (0-10yrs)	Australia	Australia	Australia	Australia	Australia	Australia	Australia	Australia	Australia
Main language/s used in 2011	English	English, German	English	English, Japanese	English	English	English	English	English
Main employer in mid 2011	Study site uni	Study site uni	Study site uni	Study site uni	Study site uni	Study site uni	Study site uni	Study site uni	Self-employed
Role at university in year 2011	Lecturer	Lecturer	Prof	Lecturer	Senior Lecturer	Assoc. Prof	Administration	Assoc. Prof	Student
Years you have been involved with study site uni	7	14	7	6	7	6	3	6	2
Highest degree awarded (prior to 2012)	Masters, PhD student	MEd, PhD student	PhD	PhD	PhD	PhD	Degree	PhD	MBA, PhD student
(Optional*) Ethnicity	Caucasian	Caucasian	Caucasian	Caucasian	Caucasian	Caucasian	Caucasian	Caucasian	Caucasian

6.4.1.2 The Combined Team Profile

All participants' demographic data as were shown in Table 6.4 were further analysed to reveal that this nine-member team composition had demographic similarities, or commonalities among participants, as summarised below:

- The team was gender-balanced, with five females and four males.
- All were between 38 and 59 years old.
- 100% identified as being of Caucasian/Anglo Australian ethnicity.
- 100% spoke English and were from English speaking backgrounds.
- 100% were educated in Australia.
- 100% had degrees (five had PhDs and another three were PhD candidates).
- 100% were employed in the higher education profession.

This analysis of the participants' demographic survey data thus provided evidence that the team was comprised of a very specific segment of the Australian and global population, and that the surface level profile among members of this particular team was remarkably similar and homogeneous.

This demographic profile similarity finding was to the study's advantage, as it removed variables from the RQ2 and RQ3 analysis. For example, KM issues caused by differences in ethnicity and culture (McManus & Mulhall, 2016) were neutralised from influencing participants' constructions of their KM capacity.

As a counterpoint however, a recent study proposed that high performing collaborative teams are created and maintained when team diversity is effectively fostered

(Cheruvelil et al., 2014). My study findings revealed a team with limited demographic diversity, yet it was still a high performing team based on the criteria of being recognised by the University Faculty for achieving particular outcomes as discussed in Chapters 7 and 8. This suggests that a deeper diversity in other human subdimensions existed within the team, beyond just demographics, to influence team performance and KM capacity. A deeper level of the human dimension is considered in the next subsection, through an analysis of participant MBTI personality preferences.

6.4.2 The MBTI Profile of the Participants

The human dimension profile of the team participants was explored by analysing the MBTI personality preferences (Myers et al., 2003) of each participant in order to obtain a deeper level study (Mohammed & Angell, 2004) of the human dimension, beyond the surface level demographics presented above. The MBTI profiles for each participant were obtained through practitioner application of the MBTI Form M diagnostic instrument.

As was explained in Section 5.4.2, the MBTI profile string plots the four MBTI dichotomies across the X axis, and the participants' MBTI preference clarity on the Y axis (slight S, medium M, clear C, or very clear VC). The MBTI preference profiles discussed below were validated by the participants on several occasions, such as during Focus Groups 1 and 2, as well as in the individual interviews, to maximise the reliability of the results. Note that I eleborate further and explore how each participant's MBTI preference influenced the construction of her or his KM capacity in Chapter 7 as part of addressing RQ2.

6.4.2.1 Lucy

Lucy completed her MBTI Form M very quickly, and analysis of her data identified that Lucy's preference was reported as I (Clear), S (Slight), T (Clear), J (Very Clear), which produced the ISTJ "profile string" depicted in Figure 6.12. In the confirmation interview, Lucy stated that she agreed with the MBTI form M result, based on her further perusal of the ISTJ reading materials with which she had been provided in the intervening period. Lucy admitted in her interview that she "definitely had attention to details". This attention to detail is considered typical of the ISTJ preference (Myers et al., 2003). My observations of Lucy's KM interactions and operations within the context of the team supported this MBTI assessment.

Figure 6.12 Profile of Lucy's MBTI Type Preference (ISTJ)

It is important to note that, whilst Lucy's preference was towards very clear Introversion and Thinking, she was also quite competent in her non-preferred modes. For example, Lucy was

competent at extroverting as she was employed as a lecturer to undergraduate students, and she had presented at numerous conferences. Also, Lucy was observed to have good rapport with others, both inside and outside the team, which was testament to her MBTI "F" ability. So, whilst the MBTI results showed Lucy's preferred style, it is important to note that this MBTI profile was just one perspective of Lucy's total human dimension, and that she had also developed her nn-preferred MBTI skills.

6.4.2.2 Emma

Emma completed her MBTI Form M returning a clear ENFJ preference, and in the subsequent interview she confirmed this result, based on her further reading of the ENFJ type descriptions with which she had been provided in the intervening period. Her final MBTI preference string profile appears in Figure 6.13.

Figure 6.13 Profile of Emma's MBTI Type Preference (ENFJ)

Emma's preference towards extroversion (E) was distinctive in this academic team, as Marge was the only other extrovert, and Marge's role was more administrative than academic. In her interview Emma seemed quite aware and accepting of her preferences, stating that she was "a little bit more E", used "the intuitive, gut feeling stuff" and "liked to focus on the longer term and the bigger picture".

After significant observations, I realised that Emma, like some others in the team, had constructed a human dimension capacity over and above her preference. As Emma said:

> The strategic stuff [Emma's "N" preference] comes very easily to me whereas the operational stuff [her non-preferred "S" aspects], I mean, I know I can do it because I've done it all my life, but it takes a lot more energy for me to make sure that I'm doing all the things that I'm meant to be doing when I'm needing to be doing them.

It is acknowledged that as people mature, they beome more comfortable with non-preferred modes of operation (Myers et al., 2003). However, I contend that Emma was more than just "comfortable" with her non-preferred personality dichotomies, particularly across the I-E and S-N modes. I assert that Emma had developed complementary "skill", in a similar way that a right-handed person can develop her or his left-handed skills to become ambidextrous. Therefore in my further analysis of this skill, I refer to this skill as "ambiminded" (refer to Appendix A).

During my further data collection observations, potential ambiminded skill appeared with regard to Lucy, Emma, Paul, Owen, Ruby, Kandy and Dave, as is discused in their respective MBTI analyses in this section. I conclude that the development of potential ambiminded skill appeared to assist those participants to be more flexible and fluent across the MBTI dichotomies,

so that they could be more effective in performing their knowledge work by adjusting their personality mindsets to adapt to the contextualised KM demands.

6.4.2.3 Paul

Paul completed his MBTI Form M, and he demonstrated a very clear INFP preference. In the subsequent interview Paul confirmed his INFP preference, informed by his further reading of the INFP type descriptions with which he had been provided in the intervening period. The MBTI preference string profile for Paul appears in Figure 6.14.

Figure 6.14 Profile of Paul's MBTI Type Preference (INFP)

In the inteview, Paul acknowledged that his MBTI preference was towards a very clear INFP preference. However, Paul also stated that he was quite comfortable working in the ESTJ mode as

well, which suggested potential "ambiminded" skill. My ethnographic observations of Paul's actions in the team operations further supported his very clear INFP assessment, yet I noted his ambiminded skill at extroverting (E), attending to details (S) and maintaining structures and timings (J) to align with ESTJ requirements. Whilst Paul may have had ambiminded abilities, his INFP preference was still evident in his KM operations. For example, his office environment appeared far less structured and organised than the "SJ" offices of Lucy and Wal. From that perspective, during the interview Paul commented on his very unstructured "P" office layout: "I actually wouldn't want it all neat and tidy, because I feel comfortable with these piles of paper - to me it shows that I'm working." So it is important to note that Paul *preferred* to work in a less structured environment - it was a conscious "P" choice, which similarly mirrored the conscious choice that Wal and Lucy had made to make their office environments reflect their "J" preferences. However, it is suggested that Paul had also developed potential "ambiminded" skills to perform in his *non-preferred* "ESTJ" environments.

6.4.2.4 Wal

Wal promptly responded to the MBTI form and in the subsequent interview Wal agreed with INFJ as being his preference. My observations of Wal's actions in his team operations further supported this assessment. The string profile diagram of Wal's MBTI results appears in Figure 6.15.

Figure 6.15 Profile of Wal's MBTI Type Preference (INFJ)

Wal's very clear NJ preference influenced his KM capacity whereby he minimised unnecessary clutter, as was discussed in his interview, with Wal explaining his office layout (see Section 6.5.1) and that he preferred to store his knowledge electronically, rather than using paper. As such, Wal's views were dichotomously opposite to Paul's, yet both participants were effective and productive KM workers. This suggests that the participants' human dimension MBTI profiles – in particular their MBTI "P" or "J" preference – resulted in a visible influence on *how* KM capacity was constructed. This *what- how* relationship also appeared visibly evident with regard to participant's KM office technology structure, as is further explored in Section 6.5.1 and Chapter 7.

6.4.2.5 Owen

Owen completed his MBTI process and in the subsequent interview he agreed with ISTJ as being his type preference. My observations of his activities within the team supported this assessment. The string profile diagram of Owen's MBTI results appears in Figure 6.16.

Figure 6.16 Profile of Owen's MBTI Type Preference (ISTJ)

One point to note was Owen's very clear preference for introversion (I), and again a *who-how* relationship was apparent in the analysis of his office technology photograph discussed in Section 6.5.1, with Owen erecting a physical wall between himself and the door to increase his privacy, and to support his introverted preference. That said, Owen also appeared to have developed "ambiminded" extroversion "E" skills, evidenced by his being a competent lecturer and conference presenter, supporting the view that Owe had developed capacity in the *non-preferred* aspects of his KM human dimension MBTI profile.

Owen also recognised the diplomatic risk that his the "T" preference could introduce into a team dynamic saying "I just want relationships to be open and trustworthy and discuss the elephant in the room and all that sort of stuff. I can't cover all those political things, I'm more likely to tell the Emperor he has got no clothes on". Owen lamented that his "T" preference may have limited his promotion prospects; however, the very fact that Owen sought to manage his "T" risks suggested the ambiminded development of his "F" skills.

It is important to note here that, similarly to Lucy, Owen was a very clear introvert "I" and only a medium "T" preference, and that I ethnographically observed that he had developed ample ambi-minded "F" social skills to soften his urges to extrovert his "T" forthrightness. Even so, it was insightful to hear how Owen perceived his "T" preference to be a limiting human dimension factor in his promotion prospects, and it would have been interesting to revisit this finding with Lucy to hear her perspective on her "T" politics. It suggests that further research could illuminate the team KM human dimensional challenges surrounding dichotomous opposites, such as the clear-very clear "Ts", like Owen and Luy, and the clear-very clear "Fs", like Paul and Wal.

6.4.2.6 Ruby

It was some time before Ruby completed her MBTI form and the follow up confirmation interview. Her Form M result suggested that Ruby had a slight ISTJ preference. However, in the interview, it appeared that she did not feel completely comfortable with this MBTI analysis and that she was contemplating the INFP written description word-picture description.

My ethnographic observations provided some evidence that supported Ruby's ISTJ-INFP questioning, as she did not always exhibit the classic ISTJ characteristics noted in the literature. For example, Ruby stated that "I really enjoy gardening, and just plant things wherever they seem to fit", which suggest more of an NFP preference. Also her interview was interrupted several times

by knocks at the door, each of which Ruby arose to answer. For one door-knocker, Ruby proceeded to have a five-minute discussion in the doorway. At my query, Ruby responded: "No, I don't mind people popping in at all; it happens all the time" and she genuinely seemed quite comfortable and unfazed by these constant interruptions. The literature (Myers et al., 2003) and my MBTI experience suggests that regular interruptions would highly agitate a clear "J" preference, such as Lucy or Wal. This suggested either that Ruby was naturally more "P" or that she had developed potential "ambiminded" skill in her "J" preference. Ruby seemed to become more agitated at the end of our interview, and she admitted that she was struggling to read the map on her computer screen in order to find her next off-campus appointment. This last-minute organisation also struck me as being more of a "P" tendency.

Based on these observations, during the interview Ruby and I discussed the ISTJ and INFP preference differences with reference to the MBTI literature (Myers et al., 2003). Ruby eventually settled on identifying more with an ISTJ preference (as originally identified in the MBTI Form M diagnostic survey) rather than the INFP preference (as exhibited in some of her actual behaviours and being a personality mode with which Ruby was obviously quite comfortable). I respected Ruby's final self-selection as having a slight-medium ISTJ preference, as is shown in Figure 6.17. In further discussion, Ruby revealed that, over the course of her career, she had become quite comfortable with either "NP" or "SJ" operations. This suggested that like Emma, Paul and Owen, Ruby appeared to have developed some "ambiminded" skills across the "NP-SJ" dichotomy, attributed to her professional development.

Figure 6.17 Profile of Ruby's MBTI Type Preference (ISTJ)

Incidentally, I have noticed similar MBTI type preference confusions and explorations in some of my biographical MBTI practitioner experiences. There have been rare instances when MBTI clients have mused over their MBTI Form M diagnostic survey results during their qualitative interview consultations. This potential discrepancy between the Form M diagnosis and the interview confirmation does not appear to be substantially explored in the literature and increases the risk of the MBTI instrument being deemed unreliable and invalid (Boyle, 1995; Hammer & Barger, 1996).

The solution (and the real power of the MBTI process), was exhibited in this case with Ruby. That is, any Form M preference confusion can subsequently be resolved during the MBTI confirmation interview process, where respondents are informed and empowered to explore and consider fully their options to self-select the personality preferences that most resonate with them. Ruby's case demonstrated that the MBTI Form M survey *by itself* may not necessarily be 100%

reliable or accurate, as MBTI other critics have pointed out (Kroeger & Thuesen, 1992; Pearman & Albritton, 1997), for the potential reasons that I have suggested above. However, when combined with the qualitative interview confirmation process, the end result improves one's confidence in the accuracy and reliability of the insights into an individual's personality preferences. Therefore this research further supports and validates the method instilled at the MBTI practitioner qualification course, whereby the MBTI Form M diagnostic survey instrument is triangulated with the follow up confirmation interview with a skilled practitioner to clarify the respondents true MBTI preference. Ruby's MBTI profile experience thus presented an interesting case that clearly benefited from the triangulation of both the Form M diagnostic survey and the interview process to identify her MBTI type preference.

6.4.2.7 Marge

Figure 6.18 Profile of Marge's MBTI Type Preference (ENFP)

Marge's MBTI profile in Figure 6.18 revealed the only other extrovert (E) in the team, albeit a slight extrovert, with big picture intuitive (N) perspectives and a preference for less structure (P). Marge's feeling (F) nature tempered any potential conflict about issues, and she was always very positive with and helpful to the team. As Marge was more involved with administration rather than with academic research, her KM activities were less studied in this research. However, rather than exclude her from the study it was interesting to compare her data with the rest of the team. My observations of Marge's interactions supported her ENFP preference result, and her Mandala title from Section 6.6.1.7, "Positive energy", summarised the general effect that her MBTI preference contributed to the team.

6.4.2.8 Kandy

Figure 6.19 Profile of Kandy's MBTI Type Preference (INTJ)

Like Ruby, Kandy presented another challenging case for me to identify her MBTI preference. The MBTI form identified Kandy's preference as INTJ; however, during the interview

discussions, she was contemplating the ENTP description. My ethnographic observations of Kandy definitely supported her ENT_ preference, as she would often eloquently present (E) rational analysis of big picture "N" ideas, and sometimes bristled (T) when her idea details were queried by the "S" preference team members. Her P-J dichotomy was more incongruent as, whilst Kandy was occasionally late to team meetings and was flexible about boundaries, she always seemed very structured and organised. Also her E-I dichotomy was complex as, whilst a casual observer would agree that she was generally more introverted, she could become excited and confidently dominate a team discussion to make her point known.

In the end, Kandy settled on INTJ from the original Form M result, as her preference in the home environment yet she became more ENTP in her work environment. Therefore, according to the literature (Myers et al., 2003) her MBTI preference was INTJ, which is depicted in Figure 6.19. It is noted that only Kandy could determine her true preference, and that the combination of the Form M tool and confirmation interview helped to increase the reliability and accuracy of her preference selection of INTJ over ENTP by clarifying her I_ _J preference.

Despite Kandy not appearing sure, it is important to realise that she agreed with her NT Form M result, which was the core of her personality preference as identified above. However, like others in the team, it appeared that Kandy had also developed professional layers around her personality preference to be comfortable working across the E-I communication and J-P structure dichotomies, and so appear "ambiminded". As was discussed above, the MBTI literature supported the theory that as individuals mature, they develop their non-preferred styles (Myers et al., 2003) and so it may be that Kandy's work experiences had strengthened her INTJ preference with both "E" and "P" skills.

6.4.2.9 Dave

The MBTI preference profile for Dave appears in Figure 6.20, which identifies his preference as an INTP. Dave confirmed that this result aligned with his previous MBTI result from several years ago, which supported the reliability of the MBTI diagnostic process over time.

Figure 6.20 Profile of Dave's MBTI Type Preference (INTP)

Dave appreciated his NT nature to analyse aspects of an issue rationally (T), and to neglect the emotional (F) aspects, and to prefer flexible strutures to adapt to any changes (P). Overall, though, Dave indicated that he was capable of working across the ESTJ-INFP dichotomy as required, rather than being fixed to his MBTI preference. Also, whilst Dave was quite comfortable in his INTP preference, he (as had Owen) had needed to learn "F" skills (the opposite dichotomy) to manage more effectively the political nuances of sitautions. This suggested that the potential MBTI ambiminded skill, similar to those of Emma, Paul, Ruby and Kandy, can be learned and personally developed by concious attention, like any other skill.

6.4.3 The MBTI Profile of the Team

The analysis of the Form M instrument and the clarifying interviews revealed the validated MBTI results of each participant in the "string diagram" figures as was discussed above. These were further analysed by superimposing each participant's MBTI profile as in Figure 6.21 to compare and contrast preferences. On 24 January 2011, during Focus Group 1, I presented this combined Figure 6.21 team MBTI profile, whereby the participants again validated their preferences and provided further triangulation of the findings (Hammersley & Atkinson, 2007). Each participant's pseudonym code (from Appendix G) appears at the right-hand end of her or his MBTI profile string. This deeper level MBTI data analysis revealed that this team had deeper diversity (Mohammed & Angell, 2004) within this human subdimension of MBTI personality.

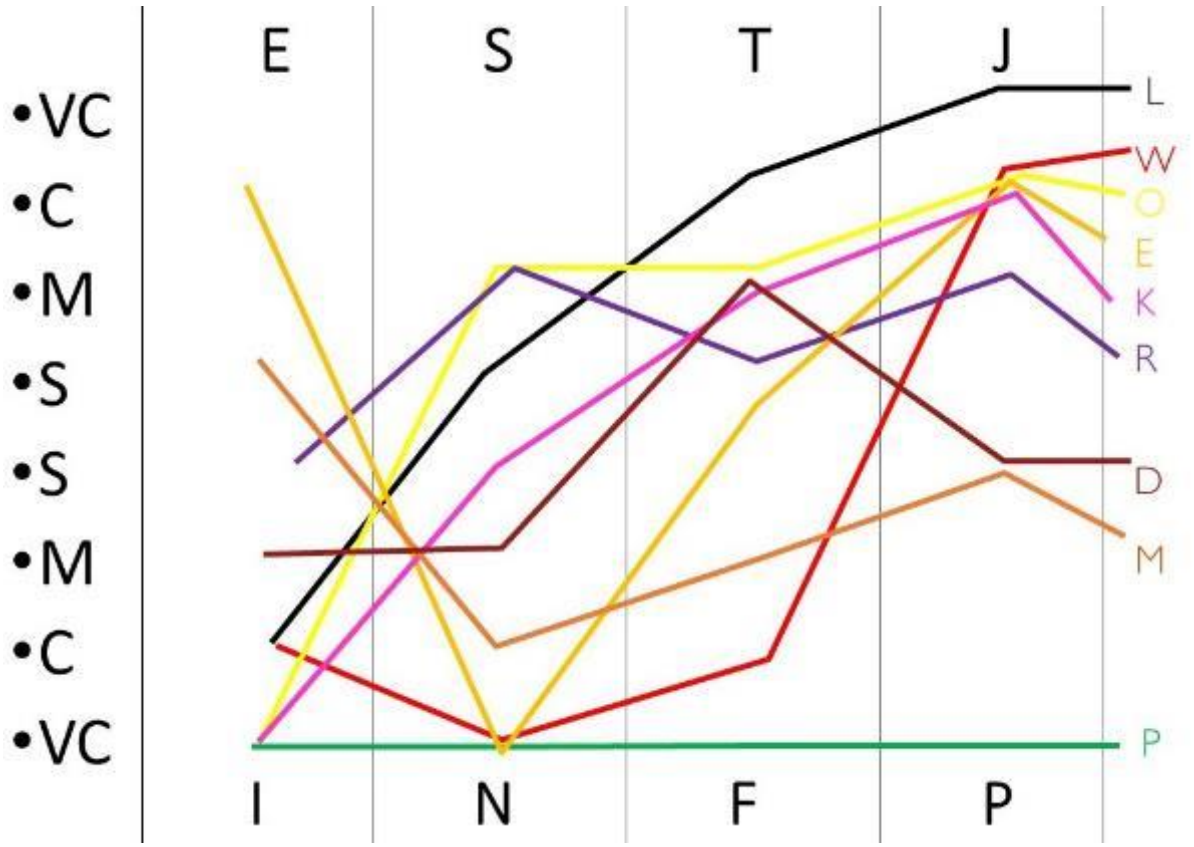

Figure 6.21 The Combined Team MBTI Type Preference Profile

Overall, the Figure 6.21 combined MBTI string diagram visually highlights the heterogeneity and diversity in relation to the participants' MBTI preferences, with the team broadly represented across each of the four dichotomies or continua, albeit to varying degrees (Matthews & Danaher, 2013). The Figure 6.21 analysis revealed that the research team being studied in this case had a diversity of MBTI preferences among the nine team members, with none having exactly the same preference. Furthermore, my analysis supported the MBTI profile as a viable academic data source for contributing to understanding the KM human dimension with regard to professional practices. Articulating participants' MBTI preferences can shed new light on how individuals perceive, approach and evaluate their work (Matthews & Danaher, 2013). These MBTI profile data are accordingly further analysed in the next chapter.

6.4.4 Conclusions about the Human Dimension Profile

The intention of this analysis was to explore the human dimension profile of the team, through the analysis of the demographic profile (surface level) and the MBTI preferences (deeper level) (Mohammed & Angell, 2004). From the demographic survey, participants within this team seemed to be a remarkably similar demographic group. However, at the deeper level, the MBTI data analysis revealed that they had considerable diversity within this personality subdimension of this team. This human dimension profile result suggested that what can superficially appear to be a homogeneous, similar group can actually contain very heterogeneous, diverse, subdimensional qualities at the deeper level. It is only when we delve into the deeper, subdimensional dynamics, as this data collection and analysis have done, that the differences within the human dimension of KM capacity become more evident. It is acknowledged that a homogenous team could potentially

introduce issues such as group think or resistance to change, however, perhaps because of the deeper diversity within this team, these issues were not readily observed in this study. This study explored *how* these demographic and MBTI human dimensional similarities and differences influenced the construction of KM capacity, which is further considered in Chapter 7 to address RQ2.

6.5 The Technology Dimension Profile

Each individual's engagement with the technology dimension became even more evident upon my visit to their individual offices at the university. I consequently obtained photographs of each participant's office to contextualise and inform a technology profile of how these academic team members constructed their KM capacity.

As was discussed in the research design chapter in Section 5.4.3 and summarised in Table 5.1. The analysis of each office photograph data source is presented in the following subsections to with the findings providing a KM capacity technology dimension profile for each of the nine participants. The offices were analysed to obtain a technology dimension profile of participants, that was further validated in the individual interviews and by my reflexive ethnographic perceptions of the offices where participants managed their knowledge.

Note that all office photographs have been reduced in resolution and photoshopped to graffiti over any identifying points, in order to protect the anonymity of the participants. Some office fittings, facilities and computing technologies standards were consistent for the whole team, and they are addressed collectively below, rather than being repeated for each individual participant.

The various places that the participants used for their knowledge work included lecture rooms, community functions, laboratories, online databases, graduations, social media platforms,

blogs, libraries, websites, publications and of course their offices. RQ1 focused on profiling each participant's office "knowledge place", and the professional KM technologies utilised there, to inform the RQ2 analysis of how that technology dimension influenced each of the nine participants' construction of KM capacity.

6.5.1 Overall Analysis of Participant Offices

Overall, each participant was appointed with the office technologies befitting a senior public official in the Australian context. That is, each had a furnished, air-conditioned office, measuring approximately four by five metres (some slightly larger). All had a window, and some had quite nice views of the university campus precincts and the associated gardens.

Each participant's office furniture and facilities were also provided with contemporary office furniture (adjustable, wheeled chair, large desk, bookshelves, noticeboard), air conditioning and ample electric lighting. Whilst each office had similar furniture technology, each had different ways in which the desks, chairs, filing cabinets, bookshelves and wall hanging space had been utilised to tailor each office workplace to suit the individual user's preferences for knowledge structure and sharing.

During the data gathering period, three members of the research team became trial users of the newly released touch screen iPads, which were wirelessly connected to the university ICT system. I observed that, whilst all participants had reasonable Internet and desktop computer access, technologies such as wireless, iPads, Skype, smartphones and cloud computing technologies were being used only by innovators and early adopters (Rogers, 1962) within the academic community. By the time of this thesis examination, the opposite situation exists, whereby anyone who does not have a touch-screen, smart device that is wirelessly connected to the cloud risks being seen as a laggard (Rogers, 1962), suspiciously resisting the technology

revolution. In this way, the 2011 context and timeframe of this study are vital to appreciate within this study's technology dimension analysis.

Furthermore, each participant's office contained similar ICT technologies. Each had a landline telephone, connected to the internal university exchange and the external network. Also, private mobile phone connectivity (on the 2G and 3G service) was available all around the university campus. A desktop computer was provided to all offices, fitted with two display screens and broadband Internet access. All computers were maintained by the university ICT Department and were installed with the latest software versions. This included the Microsoft Office 2010 suite, with Word, Excel, Internet Explorer, PowerPoint and Outlook Email applications. Other software could be installed by request, such as Endnote (a bibliographic application), Skype (a videoconferencing application) or Zoom (the university equivalent to Skype).

Computer access was provided to the university-managed hard drive, enabling personal data storage, and the university ICT department apparently backed up data at regular intervals. The computers also provided access to the Internet, which was apparently monitored. The computer also provided access to the university library databases and the student study desk portals, which were important ICTs for managing academic teaching and research tasks. The computer also connected to a university supported printer, scanner and photocopier, with printing apparently monitored by the university. I further explore "how" each participant interacted with some specific ICT technologies to construct their KM capacity as part of RQ2 in Chapter 7.

Also, in terms of facilities and amenities in proximity to the offices, there was access to a modern kitchen within 50 metres of all offices, offering refrigeration, instant hot water and a microwave oven that sufficed for catering requirements. Bathroom facilities were available, also within 50 meters. Whilst such catering and bathroom facility technologies may seem irrelevant to

readers in the developed world, it must be realised that these are vital technologies to affording participants the opportunity to focus on their knowledge construction capacities.

In summary, the office ICT, furniture and facility technologies were similar for all participants and were appropriate for Australian senior-level staff in their roles, supporting all participants to construct KM capacity. Some other aspects of the office technologies and layouts were different among participants, and these aspects are analysed below.

6.5.2 Lucy

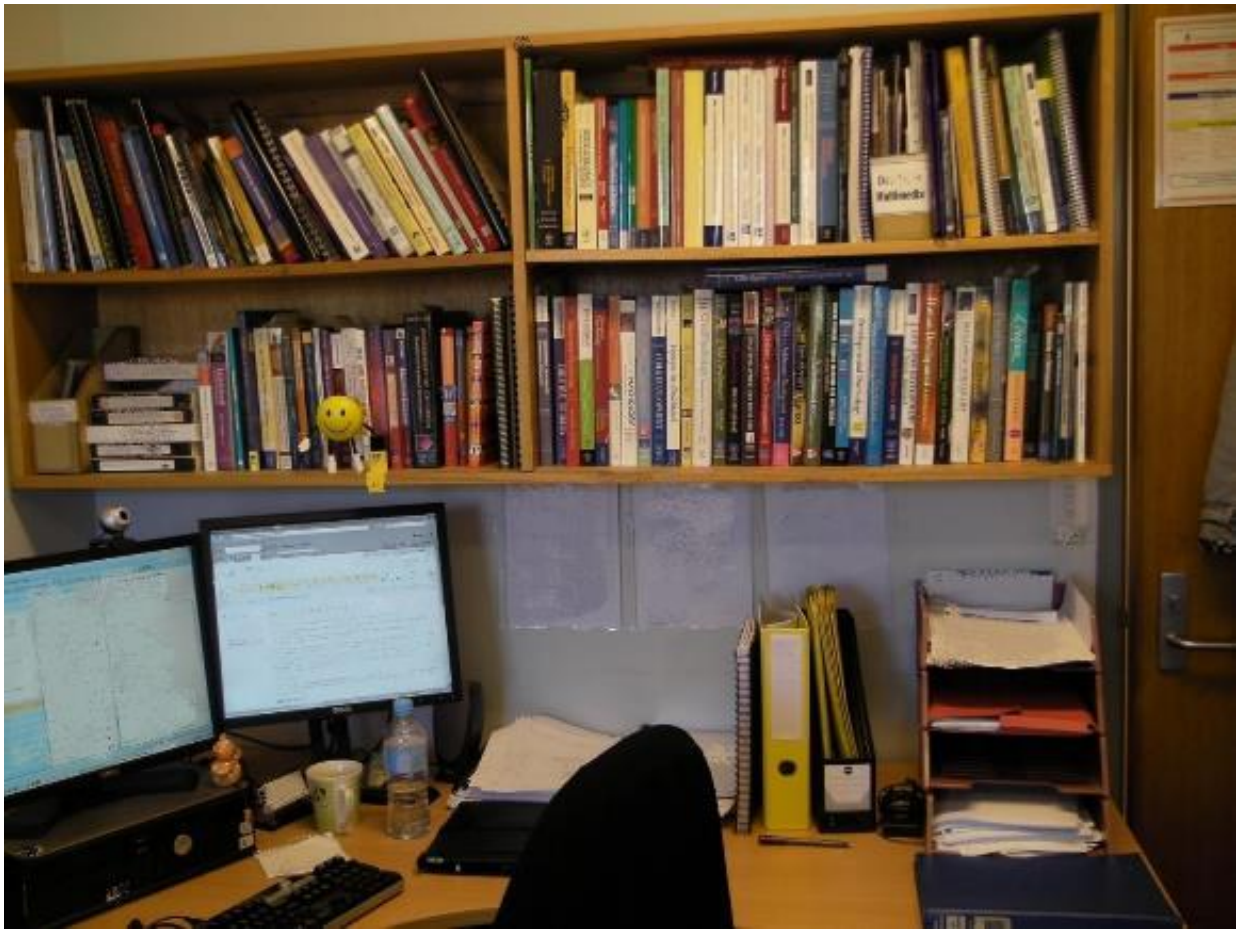

Figure 6.22 Lucy's Office Photo

Some specific technology profile aspects that were distinctive for Lucy's (ISTJ) office, as shown in Figure 6.22. Lucy reported using her office (for telephone conversations and email rather than for face-face meetings, as she found that the technology separation facilitated greater productivity time-wise, and it was "more comfortable", both reasons that aligned with her clearly introverted preference. In a classic example of the structured sensate "SJ", Lucy had colour coded her files in the filing cabinet because "it just made it easier to find them". Likewise, her bookshelf was structured by topic, like a library. Lucy appeared to have a keypad style mobile cell phone. In the interview, Lucy mentioned that "I use my office as a base to construct knowledge capacity", and exactly how Lucy used her office technologies to construct her KM capacity is explored in Chapter 7.

6.5.3 Emma

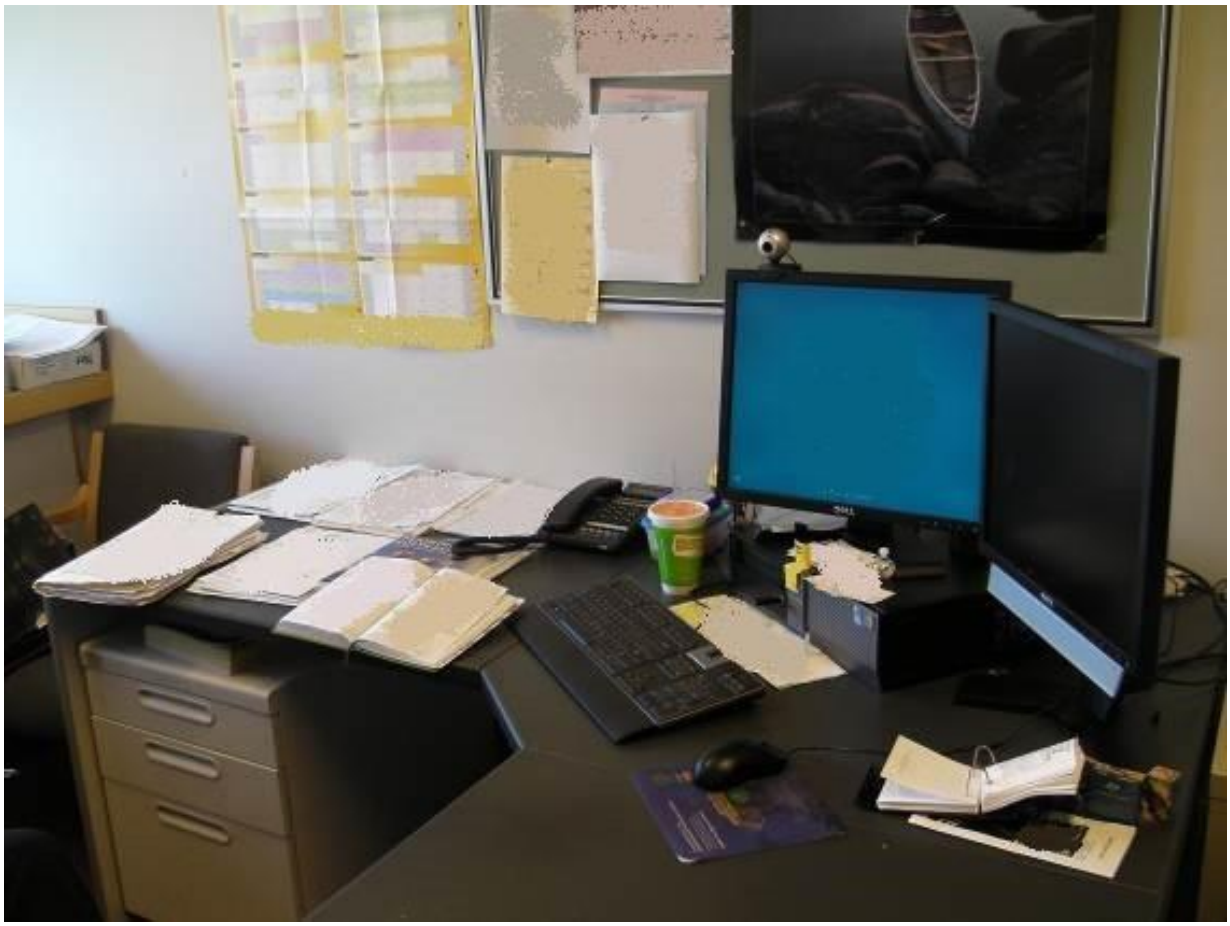

Figure 6.23 Emma's Office Photo

Emma's (ENFJ) office is shown in Figure 6.23. One specific technology profile aspect to note was that her desk was facing the door. Emma was the only academic participant (besides Paul) who faced the door, which aligns with her extroverted and intuitive preferences that might welcome serendipitous, surprise visits from colleagues.

Emma's "J" structure was displayed in the calendar and diary software technology she used to manage activities and progress. However, in my analysis I noticed that the posters did not appear to be pinned up perfectly straight, which considering her clear "J" preference was in contrast to the very clear "J" structure evident in both Wal's and Lucy's offices. In the interview, Emma

mentioned that "I rarely use my office as I work from home; however, having the office helps when I am on campus", and "This [office] is a poor representation of how I work because I don't work from here, mostly". This transient nature of Emma's work helped to explain the impermanence of her office setup, and may have delayed her nesting (Humphry, 2011). However, this variation among participants also highlights the subtle, yet crucial influence between "clear" and "very clear" preference and supports why I think it is important to communicate the MBTI preference clarity to understand these variations.

It would have been interesting to see Emma's home office, to reflect further on her MBTI influence on that more permanent office. To suffice, Emma described her home office setup during her interview, saying that:

> Everything that I do I conceptualise as a project and I use different coloured project folders. I've probably got most of them at home and at any one time there's probably about 10 on the go. They're all behind me and then I just grab whichever one I'm working on.

So, like Lucy, Emma was using colour coding technology to assist with her paper filing system, which is more reflective of her structured "J" preference.

Given Emma's F preference, according to the MBTI literature, she should have displayed some personalised technologies, such as memorabilia or photos, as Wal and Paul did, but Emma's office was quite sparse. However, in Emma's case, we know that she was only a slight F, and therefore her desire for this was not as high as Wal's and also, she was rarely actually in her office given her remote work commitments. This situation again highlighted my argument to consider the clarity of the MBTI preferences, so as to differentiate between a very clear "F" such as Wal, and the slight "F" such as Emma. Solely providing the code of "F" did not really reveal that Wal had a much clearer "F" preference than Emma on the dichotomous continuum. In this way, I

propose that my "string profile" is a superior method for analysing and comparing MBTI preferences and the influence that this may have on participants in the team context, and this was noted as a contribution to methodological knowledge in Chapter 9.4.

6.5.4 Paul

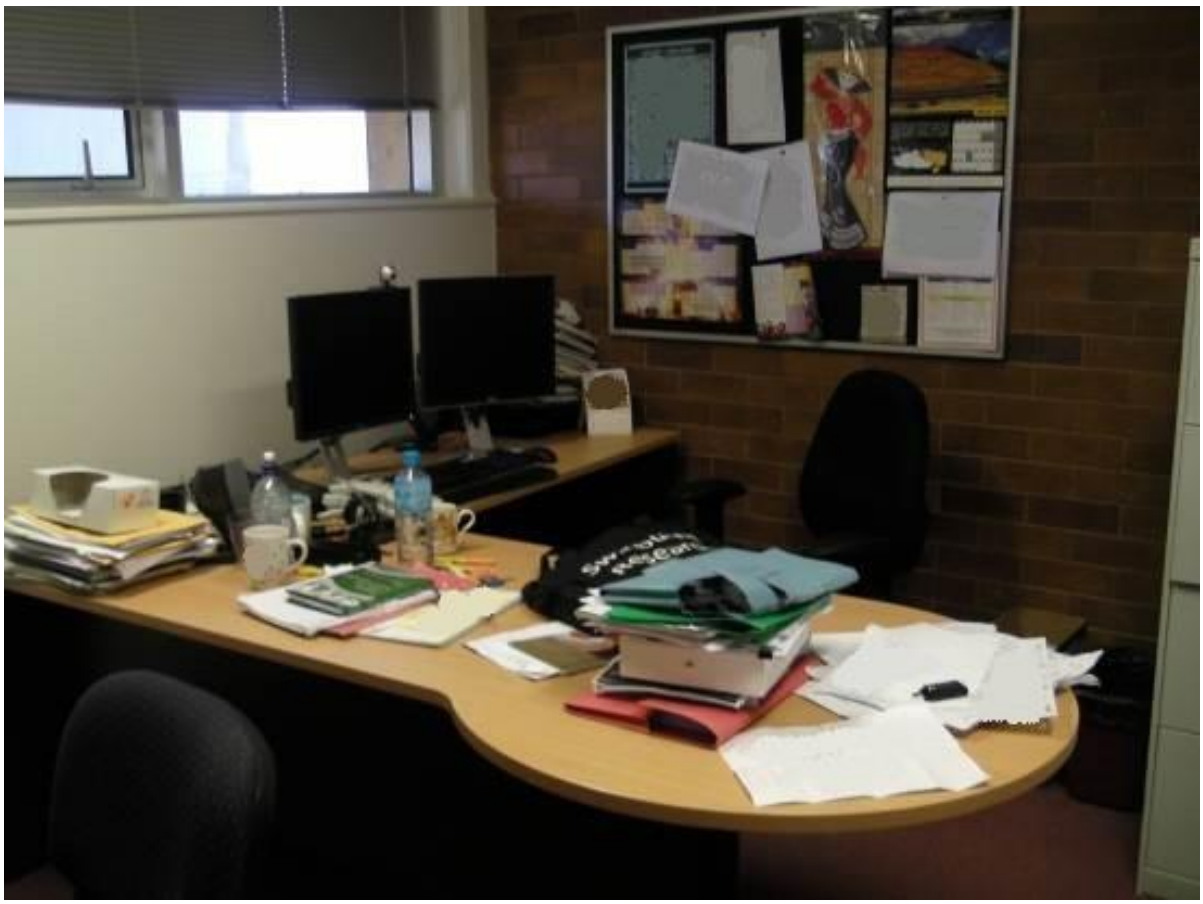

Figure 6.24 Paul's Office Photo

Paul's office is shown in Figure 6.24, and the specific technology profile aspects to note included that Paul's (INFP) desk faces the door. Paul also had a separate coffee table (albeit covered with papers) available to facilitate personal discussions (extroversions). Interestingly, Paul was the only participant to face the door apart from Emma, yet Emma was extroverted with a clear clarity whilst Paul was introverted with a very clear clarity. Therefore Paul had established

a much more extroverted office than his very clearly introverted preference would suggest. At the time of data collection, I did not realise this ironic situation of the highest introvert having the most extroverted office, so unfortunately, I did not explore the real reason behind it. I speculate that, rather than this being Paul's preference, he was conflicted by his very clear feeling "F" preference to abide by his professional role expectations involving open engagement with other academics and to resist the temptation to utilise privacy barrier technology, as Owen had done.

Paul's intuitive, unstructured "NP" preference was evident in more "flowing" office technologies, having a scattered approach to filing systems that Paul described in the interview as being "perhaps a bit messy, but it works for me". This "NP" preference of office KM technology was significantly different from those of Lucy and Wal, which were both very "J" and which had highly organised, structured office technologies. Whilst Paul's office technology may have been perceived as "messier" it still enabled Paul to have a very effective KM capacity.

Despite being a high F, Paul displayed only a few emotional related technologies, although I observed some treasured gifts buried under the piles of paper that were not visible in the photograph. Like Wal, Paul's office was professionally acceptable, with some "F" memorabilia related technologies, but not too much.

6.5.5 Wal

Figure 6.25 Wal's Office Photo

Wal's office is shown in Figure 6.25. Some specific technology profile aspects to note included that Wal (INFJ) was clearly facing away from the door, which supported his clearly introverted nature. Wal justified this in the interview as being "necessary to minimise distractions". There were a number of "F" related technologies in his office, some of which Wal proudly pointed to and explained "This is a …. from …", supporting the emotional connection that a clear "F" prefers in his work environment. The very clear "J" preference was quite visible in Wal's case, with his structure and neatness presenting an example of the clean desk policy (Sutton, 2015), in which a P preference might consider far too clinical to nest (Humphry, 2011) in. Wal was a rapid

adopter of ICT technology, and his iPad was kept within reach as his window to the world. In this way, the office photo provided a technology profile for Wal, that assisted him in constructing his KM capacity.

6.5.6 Owen

Figure 6.26 Owen's Office Photo

Owen's office was as shown in Figure 6.26. A specific technology profile aspect to note was that Owen, being an ISTJ, used a physical barrier in the form of a room divider partition technology to shield himself from the doorway so as to protect his highly introverted nature from interruption. Owen, like Emma, had a less structured desk setup than might have been anticipated for a clear "J": however, Owen explained this by the fact that he was in the middle of working on a project.

This again highlights the subtle variation between a "clear J" and the "very clear J" office technology setup as preferred by Wal and Lucy. It appeared that Owen had adopted an Apple ICT system, rather than the standard issue IBM-Windows PC; however, the hardware and software were similar to those of other participants. There were minimal emotional related technologies in Owen's office, yet it contained all the necessary functional technology to suit his "T" preference.

6.5.7 Ruby

Figure 6.27 Ruby's Office Photo

Ruby's office is shown in Figure 6.27. A specific technology profile aspect to note was that, like other introverts, Ruby (ISTJ) preferred to face away from the door. Her office revealed a rather unstructured desk top, which reveals how an ISTJs office technology setup can vary, depending on whether they are "slight-medium ISTJ" (as with Ruby) or "clear-very clear ISTJ" (as with Lucy). This variation again highlights the importance of disclosing the clarity of ISTJ preference to understand the KM capacity technology dimension. It would also be insightful to somehow measure and incorporate each participants' ambiminded skill. It was noted that Ruby's filing cabinet technology, situated behind the photographer and storing her professional paper-based (not electronic technology) records was very structured, providing evidence of her "J" preference. Ruby also had more emotional related technologies in her office than anticipated for her slight T preference, perhaps explained by her ambiminded acceptance of the "NF" dichotomy.

6.5.8 Marge

Figure 6.28 Marge's Office Photo

Marge's office is shown in Figure 6.28. A specific technology profile aspect to note was that Marge (ENFP), like extroverted Emma, had positioned a part of her desk to face the door, with her extroverted, unstructured nature being comfortable with interruptions. Her "P" preference was exhibited on the desktop with the papers somewhat strewn around; however, this did not affect Marge's work function as she was very effective and she could be very structured in her KM operations as the situation required, suggesting "P-J" ambiminded skill.

6.5.9 Kandy

Figure 6.29 Kandy's Office Photo

Kandy's (INTJ) office is shown in Figure 6.29. A specific technology profile aspect to note was that she sat facing away from the door, and that she often closed the door to avoid interruptions, which triangulated with her more introverted preference. Kandy did exhibit a structured desk, supporting her "J" preference. Yet, for a "T" preference, Kandy had a lot of nesting (Humphry, 2011) artefacts in her office, such as photographs, a plant and an ornamental chair matched with a heart shaped cushion and a lamp. This may have been a gender influence, or an ambiminded maturity that incorporated more "F" overlaying her "T" preference. In her interview, Kandy did mention that she thought she might be more ENTP at work; however, this

office technology setup aligned well with her INTJ preference. Overall, Kandy's office setup presented a homely, creative KM atmosphere that pushed the ICT technologies into the background.

6.5.10 Dave

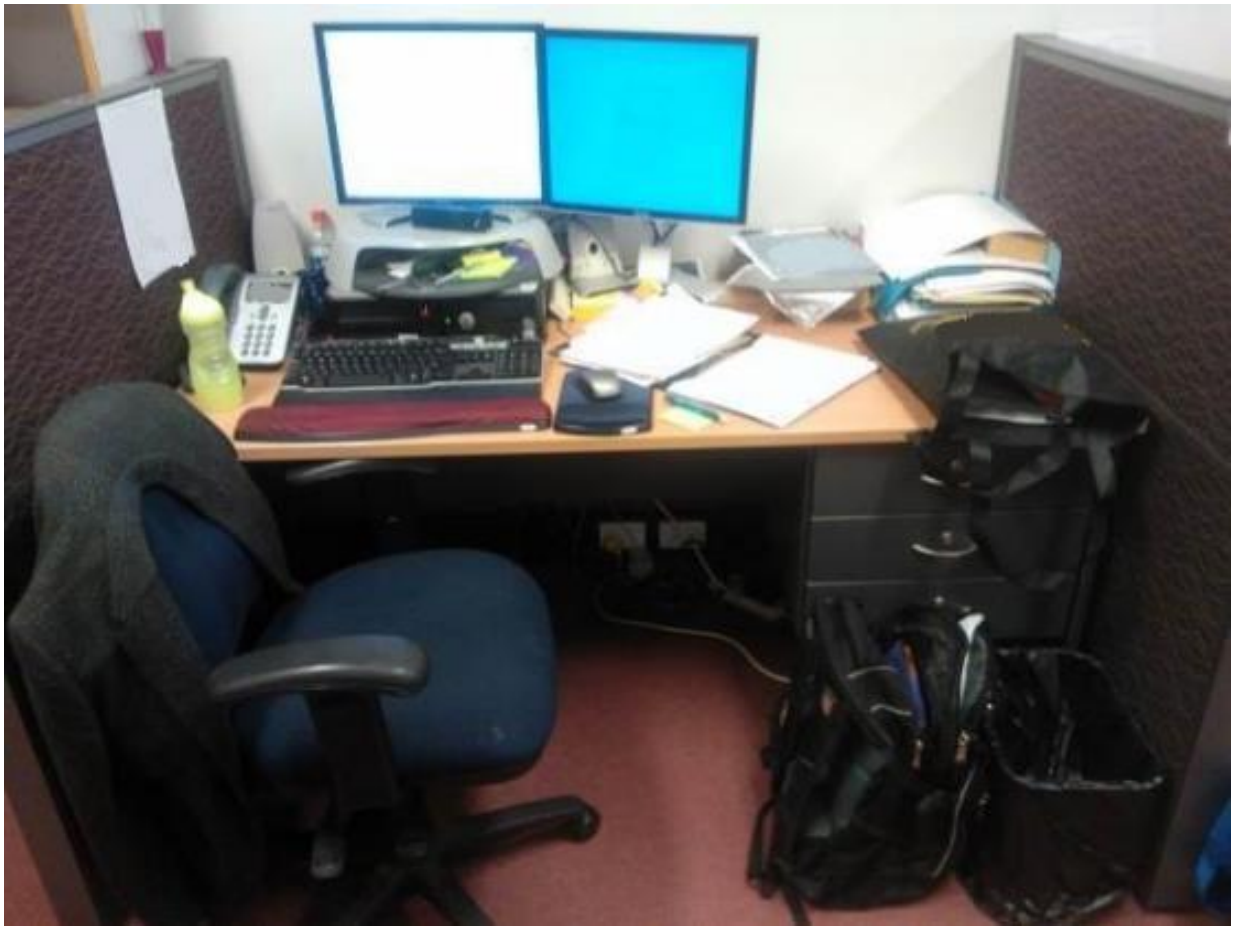

Figure 6.30 Dave's Office Photo

Dave's office is shown in Figure 6.30. A specific technology profile aspect to note was that Dave (INTP) was also facing the wall, triangulating with his introverted preference. He exhibited the rather unstructured desk, supporting his "P" preference. Dave reported utilising a portable hard-drive for the electronic storage of his files rather than using the university PC hard-drive.

Unfortunately, this study did not delve into participants' electronic file storage, so no analysis or comment could be made to that point, which could be an avenue to pursue for possible future study. Dave also utilised a paper-based calendar but indicated that the paper on his desk was really just junk that he should actually throw away, but that he kept it there because it did not bother him and given his infrequent use of the desk the papers made his desk look "busy".

6.5.11 Team Office Meeting Room

The office used for the combined, monthly team meetings was any available conference room at the study-site university. Over the period of data collection, a number of conference rooms were utilised, and a photograph of one room is shown as an example in Figure 6.31.

Figure 6.31 Team Meeting Office

The team office was not a personal space – it was just a functional place where the team individuals could meet to discuss items without external interruption. The team office then was the simplest, requiring only standard, functional aspects such as privacy, table, chairs and telephone. The telephone was often utilised to link with team members who might be physically located elsewhere, through video or teleconference (speakerphone) technology. The participants would sit around the table, in a round table format, and discuss items as required, for up to two hours as time permitted. There was very rarely any formal agenda and whilst the meetings would generally address ongoing items such as publications and events, the agenda would form organically as participants raised new items for discussion.

The team office provided an environment for knowledge sharing, rather than knowledge creation, use or storage. After the team meeting, each participant would quickly disperse to work on their own, be that in their university office or elsewhere. Participants would progress their respective create, improve, store, use and share KM process tasks, utilising their office technologies, with the implicit expectation that at the next team meeting each would discuss their KM capacity outcomes.

6.5.12 Office Photo Comparative Analysis

A comparative analysis of all the participant office photos is summarised in Figure 6.32 below and reveals that despite the office dimensions and technologies being similar, occupied by participants with similar demographics and all processing educational discipline knowledge, the individual office space was tailored as far as possible, to suit the individual's preferences (Matthews & Danaher 2015).

Figure 6.32 Office Technologies for the Team

The MBTI diversity assisted in explaining some of the office technology variations, such as the J-P dichotomy influencing the amount of structure and neatness of an office. However, I conclude that the variations were not influenced by MBTI preference alone. For example, Emma's office did not display the same level of structure as Wal and Lucy, despite their only slightly lesser "J" preference. This could possibly be explained by Emma often working remotely, and rarely in the office. Also, Paul (a very clear I) often had his door open, in contrast to Owen (a clear I) who had erected himself a privacy barrier behind which to work. I attempted to explain this difference as Paul, in his academic role, probably felt more "F" pressure to present an "open door office"

than Owen. This suggested that the participant office technology setup was influenced by both personality preference and workplace role expectations.

One common office technology theme common to all participants was the calendar. Most offices had the study site university calendar up as a (yellow, A1 size) poster on their walls, as was visible in many photographs. I observed that all participants utilised some form of daily planner and clock to manage their schedule and to arrange future appointments. In several cases, I observed participants using a Web 2.0 Internet technology (whenisgood.com), which proved an effective time management tool to improve human dimension KM capacity, by synchronising meeting times across international time zones. Thus, the "SJ" technology to structure and synchronise time, combined with the participants' personal time management skills developed over the course of their careers, was a significant enabler to help participants efficiently construct their KM capacity.

The analysis of the offices photos revealed insights into the participants' KM technology dimension. However, a causal link was not attempted to be drawn between participant MBTI preference and their KM construction because each individual was a complex system and there were many factors influencing their decisions. For example, whilst an introvert like Paul may have preferred to have a very private knowledge place (like Owen's), the nature of his professional duty likely influenced his actions, and so his office exhibited a more extroverted style. Similarly, in a professional office, only a few tasteful "F" related technologies are appropriate, and so the high "F" preferences like Wal and Paul had to be quite discerning as to what they put on display. Therefore, the office photos provide evidence of how participants adapted their preferences somewhat to work with the professional office technology in a way that conformed to the expectations that the organisation has. In a home office, this expectation does not exist, and so I

speculate that the home office technology would be more reflective of the individual's MBTI preferences, and this has been noted as a point for further study.

6.5.13 Context and Human Dimension Influence on Office Technology

The contextual environment of the university organisation and the participants human dimension aspects had influence on the office technology facilities and use. For example, participants' offices were individual, mostly permanent and real, rather than shared, impermanent or virtual. This was facilitated by the university being resourced with economic capital so as to support staff with such facilities. A workspace may be messy or clean, drab or personalised, and our workspace and desk space can say a lot about us and our internal psyche (Sutton, 2015). Some employers are removing the option that staff members have to personalise workspaces by adopting virtual offices. One of the first "virtual offices" was set up in 1994 as a work experiment by an advertising firm in Los Angeles, whereby 300 staff members were evicted from cubicles, and given a large, open plan office for all to work in, which did not work very well (Berger, 2009). In this way, the participants were fortunate to have a permanent office, that was clean, with professional furniture, and access to facilities.

Over their tenure at the university, participants they had "tailored and territorialised" their offices with the technologies that they required, personalising, customising and nesting in their offices to suit themselves, with variations on desk layouts, seating positions, decorations (photographs, posters and memorabilia), filing and "clutter". Some companies have instigated clean desk policies to improve security by removing sensitive information from desktops (Sutton, 2015). However, the clean desk policy is also a subtle way to prevent employees from "nesting" in the workplace: settling in one place for too long and giving it their personal stamp, even though it was found that professional knowledge workers performed nesting for practical reasons - to

enhance well-being, to create opportunities for privacy or collaboration, to facilitate social interaction, and to save time (Humphry, 2011). In this case, some participants, revealed more of a clean desk (Wal, Emma, and Lucy) and some a less clean desk (Paul, Dave), however this was related more to MBTI preferences, choices and practicality than to any faculty policy.

In this case, all offices had a permanent "feel" and were not shared. Contemporary office designs are predicted to adopt some version of the virtual office (Humphry, 2011). Most participants did have some "mobile office" capacity to facilitate them working anywhere, by way of their laptop computers, iPads, mobile phones, and external hard-drives. However, university office did not appear to exhibit any version of a "virtual". In this way, the participants office was somewhat "nested in", and thus reveals insight into their KM capacity.

It is also important to reiterate that the context of this study was the 2011 era. In the 2018 era technology context, when this thesis is likely to be examined, the KM technologies from that 2011 era are now largely obsolete due to the rapid evolution of the technology dimension, as was discussed in Chapter 2. In 2011, when these photographs were taken, the world was on the cusp of the smart-phone revolution, whereby a touch screen interface gave the wireless networked device a leap ahead in terms of user friendly functionality.

6.5.14 Conclusions about the Office Technology Dimension

The office photograph analysis revealed that, whilst each office exhibited similar technologies, all offices were tailored in some way to suit the participants' unique personality preferences. The technologies in each participant's office facilitate and sustain the construction of professional KM outcomes (Matthews & Danaher, 2013). The participant engagement with specific ICT technologies to construct KM capacity is explored further in Chapter 7. For RQ1, the

office photograph analysis provided a "technology profile" to give readers a sense of who the participants were and what their KM technology dimension looked like.

6.6 The Context Dimension Profile

As was discussed in the research design in Section 5.4.4 and summarised in Table 5.1, the Mandala data source was analysed to obtain a context dimension profile of participants, which was further validated in Focus Group 2, in the individual interviews, and by my ethnographic observations. The findings of this analysis are presented below to provide a KM capacity context dimension profile of the participants and the team.

6.6.1 Mandala

It was apparent from my ethnographic observations of the team interactions and activities that this team was a high performing, collaborative collective, intent on engaging with the academic context beyond the organisational boundary. To profile this context with additional evidence to support my ethnographic field observations, I deployed my Mandala method as detailed in Section to analyse and explore the context dimension of KM capacity and the team knowledge networks (Matthews, 2013b). An analysis of these Mandala data are presented below, along with the final consolidated team Mandala. The consolidated team findings were further presented at the third Focus Group 3 on 12 April 2012 (Matthews, 2012c), thereby providing further confirmation and endorsement that the Mandala method had produced deep, rich insights into the team context.

6.6.1.1 Lucy

Lucy's initial reaction to the Mandala method, when she was asked to "paint herself in a picture of the team", was typical of the ISTJ's rather straightforward response - she just did it. The resulting Mandala was as shown in Figure 6.33.

Figure 6.33 Mandala of Lucy in the Team

Upon finalising her Mandala, Lucy entitled it "Individual connections towards outcomes in a central pool". In the subsequent interview (refer to Table 5.2), I asked Lucy to elaborate on her

Mandala: "To describe what it was that she had in mind when she was doing it, what was it she was depicting?" Her response included:

> Connections between team members and the central core pool, which we throw ideas into to share/communicate together and out of that organic turmoil come some good formal outcomes. Being ISTJ, I would prefer more structure/method rather than last minute anxiety…but there is a lot of trust in the team that we will work together to make it happen.

From this self-analysis result, qualitative aspects of Lucy and her knowledge network in the team became clearer. Lucy's Mandala depicted the network of the team in a circular form, with the knowledge flowing in and around the team. In summary, Lucy's response introduced a theme that seemed to be consistent with other participants' Mandalas: that the KM capacity context of the team was orientated towards collaborative co-construction, which is explored as part of RQ2 in Chapter 7.

6.6.1.2 Emma

Emma was the only participant absent from Focus Group 2, and so she constructed her Mandala during her interview session. Whilst Emma initially consciously concentrated on the Mandala, she soon began to paint in a more "doodling" fashion as the Mandala method tapped into her subconcious interpretation of her in the team, which was the ideal intent of this process. Emma seemed genuinely surprised at her Mandala when at the end of the interview she actually stopped drawing to interpret her creation. Emma entitled it "Radiant thinking, branching out", as shown in Figure 6.34, and during the interview she explained it as:

> Me, surrounded by the star representing the team, and our connections and relationships and values and our various projects. It represents expanding, replicating, radiant thinking. The

segments are team members, because I probably place more emphasis on the people than the projects, and the other lines could be the connections and the relationships.

Figure 6.34 Mandala of Emma in the Team

6.6.1.3 Paul

Paul's reaction to the Mandala task was a chuckle about his lack of artistic ability. However, Paul soon became absorbed by the task. Notably, this task was not so much about the participants

artistic skills as about the artists' interpretations of their Mandala, whereby the artist consciously considers what their subconscious creation represents. So incidentally I was confident that Paul's artwork was always going to be perfect, in the sense that it was his interpretation of him in the team. Upon finalising the Mandala, Paul entitled it "Interactions in a good network", as shown in Figure 6.35. Paul's interpretation of his Mandala during his interview was as follows:

> Blobs of peaceful, calming colours represent the team members, enlivened by the red/brown linkages representing the team network, with some inevitable tensions as we align individual and group interests/expectations/roles. Interacting beyond this Mandala boundary are intersecting others – within and outside the university – other networks.

Figure 6.35 Mandala of Paul in the Team

6.6.1.4 Wal

Wal seemed to enjoy painting his artwork and he immediately set out on an intricate painting. Upon finalising the Mandala, Wal entitled it "All working in together". Wal said that he started in the middle of the page with a squiggle, and then just built up more and more squiggles nestled in around it to create a complex Mandala, as shown in Figure 6.36. During his interview, Wal interpreted his Mandala as:

Each team member is a line, all working in together, collaboratively bending around each other. The team effect is a pattern, creating something much more interesting and complex and intricate than if we were all just lines alone. It's more a process, I fit in with what is going next – by forming the next line.

Figure 6.36 Mandala of Wal in the Team

6.6.1.5 Owen

Owen had a no-fuss ISTJ response to the task and he delivered an insightful view of himself in the team. Upon finalising the Mandala, Owen entitled it "Moving forward", as shown in Figure 6.37. His Mandala interpretation during his interview was as follows:

> The blue is the whole team moving forward in the direction of the arrow, with the red dots being points of contestation. The team is forming, norming, storming and performing[7] for each project, where we work out which direction to move in. The intensity of the arrow shows how much I want the team to move forward.

Figure 6.37 Mandala of Owen in the Team

[7] This was Owen's unprompted referencing of Tuckman's (1965) team development stages

6.6.1.6 Ruby

Ruby was initially confused by this task and needed some further clarifications before beginning to paint tentatively; however, she was soon absorbed by the task. Upon finalising the Mandala, Ruby entitled it “Dynamic interconnections, internal and external” as shown in Figure 6.38. Her interpretation during the interview was as follows:

> Like a sun, with the center matrix being dynamic interconnections within the team, and the different ways of the different members. There are strong outward streams connecting to external people and places everywhere. The team is the cohesive centre, crisscross because they're changing and dynamic in the sense that when you work with people in the team, we often work in different ways and with different people.

Figure 6.38 Mandala of Ruby in the Team

6.6.1.7 Marge

Marge was quite happy to do the Mandala, encouraging Kandy and Ruby to "just paint something". Marge ended up with a colorful Mandala, and entitled it "Positive energy", as shown in Figure 6.39. She interpreted it during her interview as follows:

I am the centre of a spinning ball of energy, like a sun, and I've got these things going out, and they touch the people that I work with around me. Hopefully I'm imparting positive energy and enthusiasm and momentum; looking for good things that can come out of it; happy colours.

Figure 6.39 Mandala of Marge in the Team

6.6.1.8 Kandy

Kandy was initially confused by this Mandala task and needed some further clarifications. Kandy thought for a minute, then had a big picture "N" idea and was finished quickly. I admit reflexively that I was a little concerned by Kandy's rapid production of a flat black artwork. However, I was relieved when, upon finalising the Mandala, Kandy entitled it "Freedom to explore and add value". Her Mandala is shown in Figure 6.40, interpreted during her interview was:

In the team I can be a blank canvas, a clean chalkboard, to be open to explore things. I don't have to put on a mask or wear a colour. I have the freedom in terms of space to explore, to expand my thinking, trusting in the team that whatever we create will value add. From my blank canvas, I add my 'gems' to the team's pile. Together we can offer a more diverse and colourful range of gems to our team output.

Figure 6.40 Mandala of Kandy in the Team

6.6.1.9 Dave

Dave enjoys creative artwork and decided to use up all the left-over paint with an abstract method to create a freely-flowing Mandala, which he entitled "Learning from experience", as shown in Figure 6.41. Dave's self-interpretation perceived the shape of the figures of two people (an adult and a child) in the centre of the picture, which he further interpreted as follows:

Like a child around a campfire, learning from the elders. I respect the wisdom of the team members, learning as a student does from teachers. I observe the team operations carefully and I contribute to assist the team to build and share internationally its body of knowledge and productivity.

Figure 6.41 Mandala of Dave in the Team

6.6.1.10 The Combined Team Mandala

The combined team profile was a compilation of all participants' Mandalas, as shown in Figure 6.42, enabling visualisation of the diverse contextual dimension views by participants in the team. Marge's Mandala was not included in this combined view as she was in more of an administrative role within the team rather than a research role, as was discussed in Section 4.4. The team Mandala compilation was presented to the team for confirmation and further discussion during Focus Group 3 on 12 April 2012. Prior to sharing these data with the team in that presentation, formal consent was obtained from all participants, as was discussed in Section 4.5.

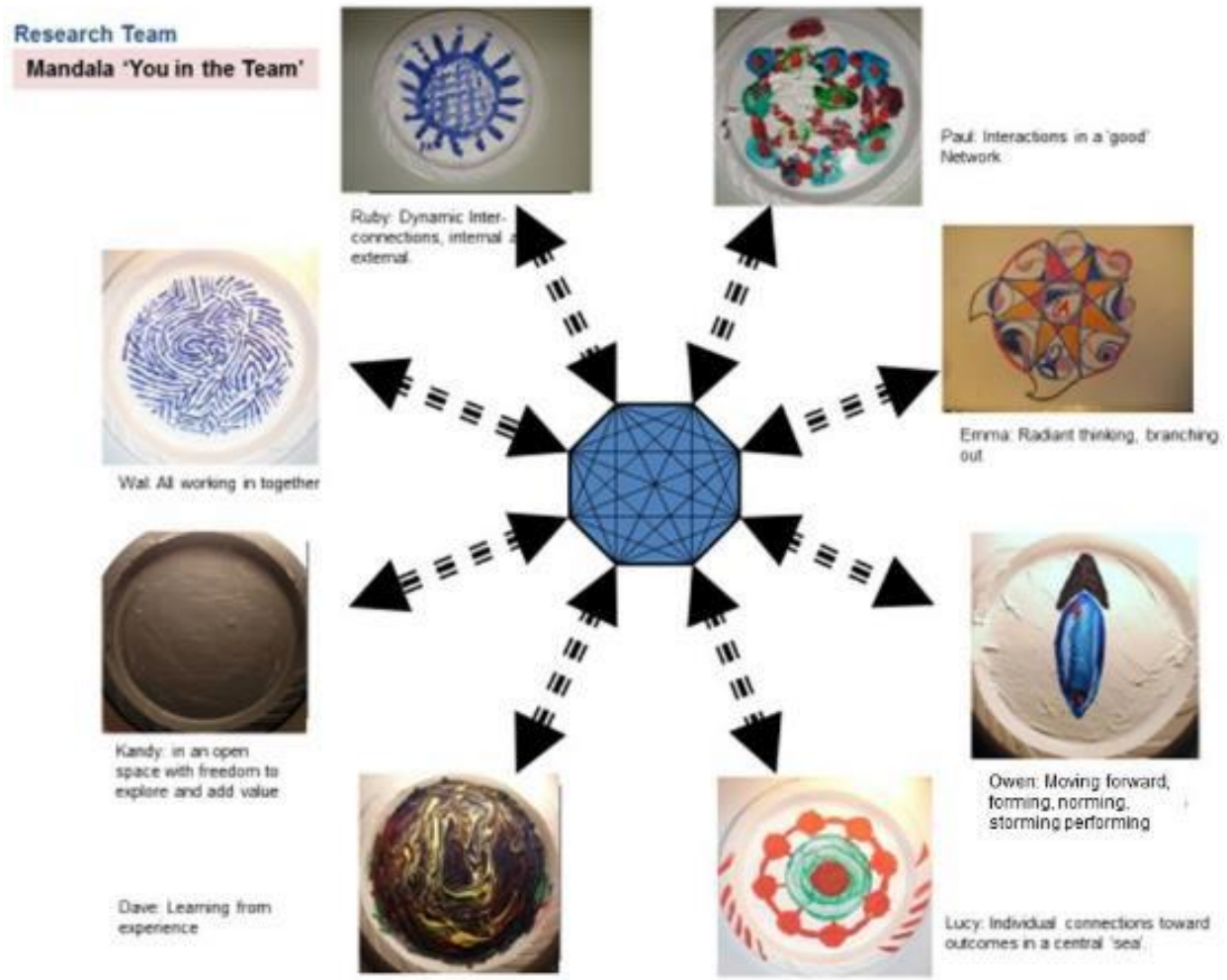

Figure 6.42 Team Mandala

6.6.2 The KM Capacity Construction Concept

The Mandala assisted in visually revealing how the team was collaborative and non-hierarchal. The Mandala method also recognised the participants' KM interactions across the individual, team and organisational levels as described by my distilled C-Z framework from Figure 2.5 of the literature review. However, in their Mandala data analysis, all participants alluded to KM interactions with another, higher "network" level beyond the boundary of the organisation. Words such as "expanding, replicating, radiant thinking" (Emma), "strong outward streams connecting to external people everywhere" (Ruby), and "interacting beyond this Mandala boundary are intersecting other networks" (Paul) indicated the team's interest in a level beyond the organisation, which I call the "network" level.

This network level may not have been incorporated into the original C-Z theory or in previous research (Bontis et al., 2002) as it seemed focused internally on the organisation, rather than on the knowledge flows beyond the organisational level. Yet, in the context of this university research team, the Mandala data analysis, triangulated with the Wordle data source, revealed that participants sought to engage formally beyond the organisational level with this network level.

KM interactions with the network level have been recognised previously. However, they need to be understood further. For example, it has long been recognised that, for organisations and their leaders, one of the biggest paradigm shifts is to move from looking at teams, organisations and nations as individual units or entities to understanding and engaging with the networks of which they are a part (Winter, 1993). The Mandala data revealed evidence that the participants engaged with this network level, and this was supported by ethnographic observations. The formal processes that participants used to engage with the network level, being their broader national and international collegial, peer group networks, was through conferences and publications, seeking

creative inspiration, constructive review feedback and improvement. By organising around the information needs, many management layers became redundant (Drucker, 1992a), and in this way, the team's collaborative, non-hierarchical structure and organisation were well-suited to achieve this network level engagement.

This network level insight, originating as a result of this study, leads to a further extension to my KM capacity construction concept as theoretically developed at Figure 3.2, whereby another knowledge level is added to reflect who participants were engaging with: the network level existing beyond the organisational boundary. This refinement, as depicted in Figure 6.43, assists in understanding the process flow across the various KM context levels, reflecting who (individuals, team, organisational and network levels) was engaged in the construction KM capacity in this study context.

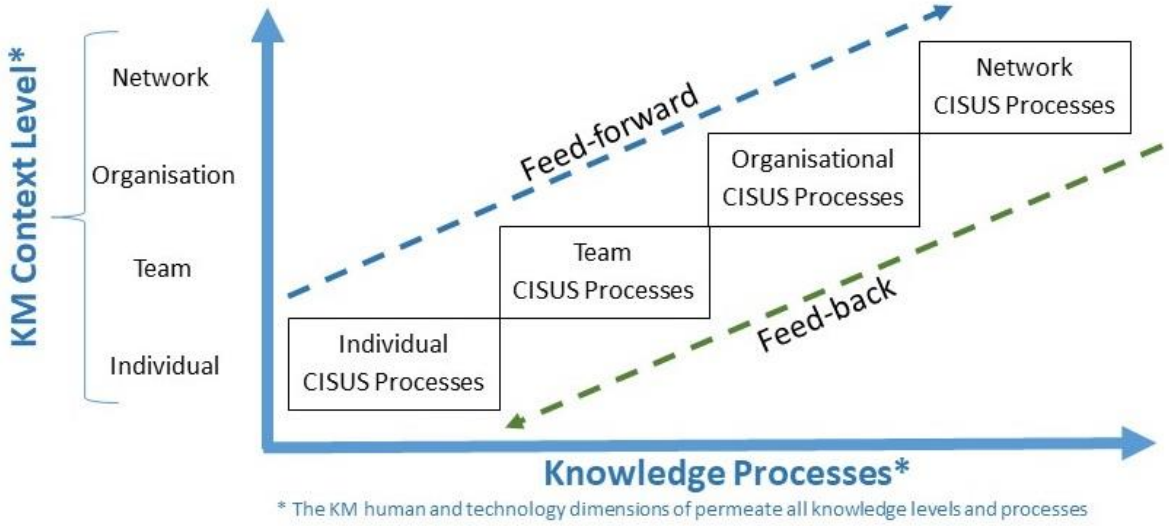

Figure 6.43 The KM Capacity Construction Concept

This KM capacity construction concept show at Figure 6.43 aligns closely with, yet is subordinate to, the overall conceptual framework of this thesis, the KM capacity-capital

architecture, as developed at Figure 3.5, which provides the wholistic thesis structure for analysis of the empirical data sources to address RQs1, 2 and 3.

6.6.3 Conclusions about the Context Dimension

The intention of this RQ was to explore the case study team KM context dimension, with the Mandala data source analysed to profile "who" was interacting, revealing across the individual, team, organisation and network levels of the KM capacity construction concept evident in this case. In Chapter 7 further data are analysed to reflect on "how" the participants engaged with the KM capacity construction concept, and particularly the network level. In Chapter 8 consideration is given to "why" this multi-level engagement was important in this particular team context, particularly for the organisation and network levels.

6.7 RQ1 Findings

This analysis of the RQ1 data sources has provided a rich tapestry for the readers to gain an understanding of the "who and what" profile of the participants and of their KM capacity across the process, human, technology and context dimensions. Some further points to note from this RQ1 data analysis are noted below.

6.7.1.1 Data Granularity

Overall, the analysis of data pertaining to RQ1 revealed a rich picture of the team profile across the four KM capacity dimensions. In the human dimension, the data analysis revealed that a surface level, demographic glance at this particular team would conclude that all participants were similar, and it would be logical for one to then assume that all of the team members were "peas in a pod" occupying the same niche of the broader Australian population demographic

segment and therefore possessing similar KM capacities. However, as RQ1 delved into the deeper level subdimensions of the participants' profiles, the data analysis gained a "granularity factor".

This "granularity factor", whereby the diversity and differences appear only once one zooms into the detailed, close up view of an individual profile, was realised as a special aspect of this study. This was because, for example, in any team, there may exist different nationalities, different educational pedigrees, even different specialisations, and so even the surface level analysis would reveal a granularity of diversity within such a team. In this particular team, this diversity among individual participants was not so obvious at the superficial, demographic, surface level, yet once the data sources had exposed the deeper level detail of the KM capacity subdimensions, that "granularity factor" enabled the team diversity to be distinctively discernible.

The more one delves into each data source, the more granularity one would get on that particular subdimension. This study limited the granularity of participant's four-dimensional KM capacity analysis as is presented in this thesis, as the study was bounded by practicality. Complexity of KM capacity would increase if additional data sources and analysis granularity were to be added. This granularity factor suggests that a truly wholistic KM capacity profile, extended to account for all the various subdimensional qualities of each participant, and expanded to be analysed for finer granularity, would grow exponentially.

The granularity factor, as defined above, provided by the RQ1 data analysis, delineated the participants' diversity, such as the specialist knowledge being CISUS processed, and the MBTI and office technology preferences. This granularity of diversity differentiated each participant with a unique KM capacity, so that when participants combined as a team, the overall team was provided with a broader KM capacity than any one participant possessed. Through this description and delineation of the various subdimensions of each participating team member's profile, the

diversity within the overall team profile became more visible. For the purpose of this study, which was to explore wholistic KM capacity, the granularity achieved in this analysis was appropriate to address RQs1, 2 and 3 and to support Chapter 8's conclusions.

6.7.1.2 Team Diversity

The term "diversity" is used to refer to the distribution of personal attributes among interdependent members of a work unit (Jackson, Joshi, & Erhardt, 2003). Based on this chapter's analysis, and the above granularity factor, it has been shown that, despite initial appearances of similarity from the demographic survey profile, deeper analysis of the various subdimensions of the process, human, technology and context dimension profiles, reveals a rich diversity in the team profile. So, whilst the team may appear similar at a surface level, there was evidence of deeper level diversity among the KM capacity profiles of nine participants in their process (CISUS activity and knowledge being CISUS managed), human (MBTI preferences), technology (office setup) and context (engaging across all levels) dimensions. This diversity in the participants' profiles, once revealed through RQ1 analysis, has provided a theme in relation to which RQ2 is considered, exploring how this diversity among participants influenced the construction of KM capacity.

6.7.1.3 KM Capacity Construction Concept

This Chapter 6 data analysis, particularly the Mandala context dimension data, has led to a refinement in the KM capacity construction concept as shown in Figure 6.43. This KM capacity construction concept helps to explain who is involved in the process, human, technology and context dimensions of constructing KM capacity, showing the

interconnection between the individual, team, organisational and network levels. This concept will be further applied for RQ2 and RQ3 analysis.

6.7.1.4 Data Analysis Caveats

At this juncture it is appropriate to articulate two crucial caveats in this analysis. The first is that no value judgment was made or intended about any team member's process, human, technology or context dimensional qualities. All the RQ1 data, especially the MBTI string diagrams and Mandalas, should not be ranked as good or bad, better or worse – they are all intended to provide a qualitative profile of the team. The second is that no causal link was asserted between the KM capacity dimensions and/or the data sources. Nevertheless, the analysis did highlight the deeper heterogeneity across the team members' KM capacity profiles. This diversity accentuates both potential challenges and associated opportunities associated with working together effectively as a research team to generate productive personal and group outcomes within the university context in which they worked (Matthews & Danaher, 2013). In this way, this RQ1 analysis, exploring the team's KM capacity profile, has provided foundational insights into the RQ2 and 3 data analysis in Chapters 7 and 8.

6.8 Conclusions to RQ1

The analysis of the various data sources in this chapter has provided a profile of each participant, framed by the four KM capacity dimensions to address RQ1. In combination, the triangulated analysis of the selected data sources reveals the diversity among participant knowledge, MBTI preference, and technology use, yet also some similarities in terms of demographics and their context perceptions. The MBTI string diagram and the descriptive surveys developed for this study, as shown in Table 5.1, all add methodological significance to my study

whilst also providing a visual representation that stimulated my ethnographic observational reflexivity. The analysis has demonstrated the diversity in the data granularity and revealed the complex interconnections between each participant's KM capacity process, human, technology and context dimensions that has led to the refinement of the KM capacity construction concept, as shown in Figure 6.43. In the next chapter, additional data sources are analysed to explore *how* the participants constructed their KM capacity, to address RQ2.

7. RQ2 DATA ANALYSIS: CONSTRUCTING KM CAPACITY

7.1 Introduction

This chapter builds on the RQ1 analysis in the previous chapter to now consider each participants' KM dimensions (process, human, technology and context) in answer to *RQ2, "How did the research team members construct its KM capacity?"* Empirical data from a variety of data sources are analysed (as shown in Table 5.1) to provide deeper qualitative granularity in addressing RQ2. These data sources include the Focus Group 3, MBTI survey, CISUS activity survey, technology survey, semi-structured interviews, ethnographic observations and secondary data artifacts (reports and publications).

The analysis of these RQ2 data provides one perspective on *how* a research team constructed its KM capacity. Importantly, the data reveal how each participant's unique construction of KM capacity across the four KM dimensions contributed to increasing the overall, collective team KM capacity (Matthews, 2012a) so that the whole team KM capacity became greater than the sum of its participant parts. These RQ2 findings inform the RQ3 analysis in Chapter 8 and support the relevance of the conceptual framework to wholistically understand the construction of KM capacity.

7.2 The Structure of This Chapter

This chapter has four main sections that correspond to each of the four KM capacity dimensions (process, human, technology and context) in Sections 7.3, 7.4, 7.5 and 7.6 respectively. Section 7.7 provides further discussion on the wholistic and collaborative co-construction of KM capacity in light of RQ2 analysis findings. Section 7.8 then concludes the chapter.

7.3 The Process Dimension of KM Capacity Construction

This section focuses on how KM capacity was constructed by the participants' engagements in the process dimension, based on analysis of the semi-structured interview responses, triangulated with data from Focus Group 3 and ethnographic observations. This section continues to use the create, improve, store, use and share (CISUS) KM processes subdimensions as the organiser to discuss the findings. The CISUS model was introduced in Chapter 2 and applied in the previous chapter.

The CISUS survey analysis from RQ1 revealed that all participants were actively involved with the CISUS processes on at least a monthly basis and in some cases engaging daily and even hourly with the KM process dimension. The team itself also recognised the complexity of this process dimension, noting that the capacity-building processes are multidisciplinary and may be realised at community, industry, organisation, team or individual levels (Case Study Team, 2011b). These KM processes are considered a crucial element of enabling universities to be productive places of learning and teaching (Matthews, 2012a). The analysis and interpretation of the various data sources pertaining to *how* participants engaged with the CISUS processes in their research activities is presented and discussed below.

7.3.1 Creating Knowledge

This subsection explores *how* participants engaged with the create process of constructing their KM capacity. Two specific aspects within these KM create processes are explored: the use of "zones" and the different "rates", as is discussed below.

7.3.1.1 Process "Zones"

The use of "zones", or workplace environments, seemed to help to construct the capacity of the researchers as they switched modes between their various KM processes and tasks. Some zones seemed more conducive to operational tasks (such as email, reporting, and filing) and other zones were deemed better for the more creative tasks such as realising and documenting novel perspectives that would contribute to academic discourse. Kandy alluded to her use of knowledge zones:

> Strategic, blue sky thinking needs more time and space – it is more circular than linear. Whereas the detailed, task orientated stuff is just breaking each task into little steps and getting on with it. I don't find it hard to work in either way, they each need time but also need a very different space to be in for me.

For creating knowledge, Paul was quite specific during his interview in stipulating his home office was his more creative space and his office at the university was more useful for other management aspects related to his academic duties. Ruby also noted in her interview that she would rather create knowledge at home than in her university office. In her interview, Lucy reported that she preferred to create knowledge in an isolated place, away from noise and other distractions, and on an ICT workstation that was in a dedicated "creative zone". It was also ethnographically observed that most, if not all, participants did at least some of the KM capacity constructions from their home office, or from other locations such as coffee shops, libraries and in hotel rooms when travelling for conferences. The opportunity to utilise the most appropriate, or perhaps conducive, knowledge creation zone seems to be a factor in constructing KM capacity.

Paul also stated in his interview that the morning was his most creative time and that he would try to leverage his mornings to do his more creative work. There is evidence to support this claim, with several of Paul's emails posted in the very early morning. By contrast, Ruby and Dave

talked about how they would often work on their creative processes late into the night from their home offices. Thus, time zones as well as work zones existed that participants preferred for their KM creative processes.

7.3.1.2 Process "Spark" and "Burn" Rates

The process of creating knowledge also varied among participants in terms of the rate or speed of knowledge creation, which may be reflective of their MBTI personality preferences. For example, "P" preference Paul identified his creative knowledge thus:

> Quite often, I've sat in front of a blank computer screen, saying this article's due tomorrow, help! But the adrenaline flows and there's enough [knowledge stored for use] there. Something happens and there's a spark or whatever it is and there's an argument that unfolds, that develops and there's the notion of flow, where you're really immersed in the creation of that particular text and I really enjoy that. It's frustrating and some days it flows more easily than others, but it seems to work.

This contrasts with the creative process of a strong "J", with Lucy describing her knowledge creation process:

> I don't like last minute stuff. The team once had two days to complete something. I can't cope with that. That was not good for me. It was like, what are we doing? For me, I would go no, not going to do that. That's just not enough time to do it properly and I couldn't deliver on that. So, the whole team's approach to just jumping in there and giving it a go that I find a bit daunting because it's not what I would do on my own. But as a team it's okay because I know that we're all there for each other. It was freaking me out.

This contrast shows that the human dimension of personality preference influenced the create process of KM capacity. The "P" preferenced Paul thrived more on the "spark" of spontaneity, whereas the "J" preferenced Lucy preferred a more steady, structured "burn" work-flow. This contrast between the "spark" and "burn" styles distilled for this study aligns with the P-J dichotomy differences that is recognised in the literature (Myers et al, 2003).

A maxim ascribed to Thomas Edison is "Genius is 1% inspiration and 99% perspiration" (Dyer & Martin, 1910). For knowledge creation, both "inspirational spark" and "perspirational burn" processes were necessary and complementary as it was the participant's combination of processes that achieved the final KM creations. For example, all team members committed to delivering their respective book chapters by the due date and each worked remotely on their chapters, applying both "inspirational spark" and "perspirational burn" KM creative processes to produce the required outcome. This observation of the team KM construction reveals how the participants' ambiminded abilities aided their KM capacity, whereby each member of the team performed both "spark" and "burn" creative processes, such that the "P" preferenced participants in the team still did the "burn" process, and likewise the "Js" the "spark". The published book artifact was evidence that each individual team member's ambiminded knowledge creation process was successful in its own right as they all contributed to constructing that KM output.

The potential process work-flow differences between the spark and burn may arise from the P-J dichotomy, which can cause conflict in a team (Myers et al, 2003). However, in this case dysfunctional conflict was avoided by the supportive, collaborative team culture, as reflected in Lucy's above comment about being "freaked out…but okay". Paul also mentioned that he enjoyed doing the KM create processes the most and saw creativity within the team dynamic as a collaborative exercise. This perception is further highlighted by all participants' depictions of the

collaborative relationships within the team context (refer to the Mandala analysis in Section 6.6). Kandy elaborated on this collaborative creation dynamic:

> The create process is the key element of the team's KM, because creating the relationships, creating a different way of thinking, creating a different way of knowing or doing is the important essence of the team. If I'm just managing knowledge, well, I can read alone, I can create summaries or archives - you can do those things alone. It's the creation of the knowledge that, for me, is the essence of, is the key connector. Together, we collectively build the capacity to create, to be creative in terms of a research space. We can create new knowledge or create different ways of understanding complex situations.

Thus, the result of the collaborative culture in this team was a creative spark and burn process dynamic, across time and work zones, that constructed KM capacity and delivered outputs as explored in Chapter 8.

7.3.2 Improving Knowledge

This section explores *how* participants engaged with the improve process of constructing KM capacity. Three specific aspects within these KM improve processes are explored: the use of "knowledge baselining", "team discussions" and "peer review".

7.3.2.1 Knowledge Baselining

When improving knowledge, all participants were observed to first establish a baseline of knowledge upon which they could improve. Various activities were performed by participants to obtain this knowledge baseline including searching the literature via online databases, engaging with specific communities of practice, and searching the web for specific words and topics (Matthews, 2012a). Note that some 20 years ago, when this internet search technology did not

exist, this knowledge search would have been done more manually, by reading hard copy journals in the library archives. As such, the technology dimension evolution has revolutionised the way a research team searches for knowledge gaps to improve upon.

Whilst all participants appeared familiar with various ways to use paper and electronic sources to establish a knowledge baseline on which they could improve, each reported and were observed to prefer their own unique practices. That is, there was no standard method to obtain a knowledge baseline, and even if participants used similar tools, how they used those tools was also a personal choice. Furthermore, these knowledge baselining practices seemed to be evolving as new tools and techniques were developed in the university context. For example, some years ago, participants would not have used the "Google Scholar" academic literature search engine as it did not exist, yet it now appears to be a helpful technology to baseline participant knowledge, with participants utilising it to some extent. Others had adopted "news feeds" from scholars and publications in their network that were relevant to their knowledge specialisations. Also, Wal concluded that his iPad had proved very convenient "to access and read stored knowledge, and to find new ideas." This evidence suggests that the participants were open to improve their knowledge baseline by being agile in adopting these new ideas and technology tools to gain greater KM capacities and competencies (Matthews, 2012a). This development also shows the KM process dimension intersection with the human and technology dimensions, as discussed in Sections 7.4 and 7.5 respectively. Thus, knowledge baselining was a vital aspect of the knowledge improvement process.

7.3.2.2 Team Discussions

From observations, there appeared no standard, explicit process that the team followed to achieve their improvement activities. However, there is evidence in emails and team meetings to show the team used team discussion as a process to improve knowledge. That is, participants often collaboratively discussed improvement activities and ideas together before any final KM capacity improvement decisions were made. In their interviews, all participants alluded to the fact that the team culture was collaborative and committed to improving knowledge through discussion within the team. I perceived the KM capacity improvement process purpose of the team as depicted in Figure 7.1, whereby the knowledge in (K) was knowledge managed (KM) and collaboratively discussed by the team in order to produce some knowledge advancement (K+) as the team output (Matthews, 2010). This model is still useful to highlight the team discussion aspect of the KM improvement process as they established the knowledge baseline (K) and improved it (K+).

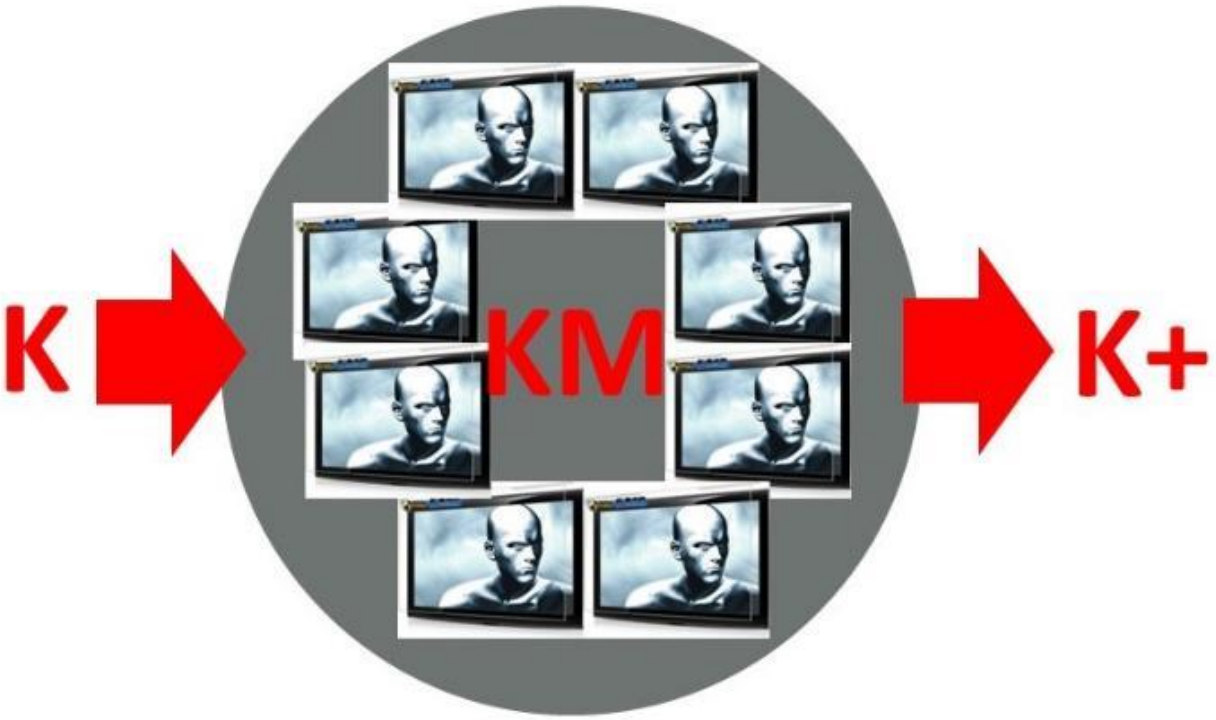

Figure 7.1 The Team KM Improvement Process Purpose

In a subsequent co-authored publication (Matthews, Midgley, Cotta, & Danaher, 2010), the team KM improvement process was further considered through the evocative metaphor of "cocoon communities" (Korpela & Dervin, 2013), in this case considering discussions within the "research team cocoon" to ultimately achieving knowledge metamorphosis. That is, the team members worked together to metamorphose the input knowledge within the cocoon boundary to output new knowledge (Matthews, Midgley, Cotta, & Danaher, 2010). In this sense, the team cocoon had specific purposes that generated new purposes (teleological); there were tensions between individual and group interests (boundedness); the team cocoon changed internal and external dimensions of knowledge (metamorphic); and the team cocoon was part of an ongoing cyclic process of activity and aspiration (reproductive) (Matthews et al., 2010). From an ethnographic

perspective, the cocoon provides an apt metaphor to encapsulate the discussions within this team boundary as a metamorphic process for KM improvement.

7.3.2.3 Peer Review

Another process that participants utilised, mainly as a final process to improve their knowledge that was to be published, was engagement with external reviewers in the form of either formal peer reviewers for double-blind improvement suggestions, or they recruited colleagues for editorial purposes. The purpose of gaining external review was to help to improve the final products that the team produced. Most notably within the academic dimension, any publication that has undergone formal peer review is held in higher regard than any publication that has not gone through the peer review process, to the extent that academics will often offer their hard work for free if it is to be published in a higher-ranking, peer reviewed journal. This evidence suggests the peer review process added social and cultural capital value to the KM output as is elaborated in Chapter 8.

Many peer reviews of draft publications would be returned to the authors with suggested changes, and team members who received such constructive feedback were appreciative of the improvement opportunity that peers' insights offered to improve their KM capacity output. This process of KM improvement is deeply embedded within the culture of the academic research profession and was ingrained amongst the participants, such that participants actively sought out (and provided) constructive feedback from the peer review process in order to facilitate continual improvement of both individual and team knowledge. As a result, all participants were well versed and comfortable in that peer review process of KM improvement process.

7.3.3 Storing Knowledge

This subsection explores *how* participants engaged with the store process of constructing KM capacity. Three specific aspects within these KM store processes are explored: the use of meeting minutes, correspondence, and electronic storage. The other significant process of storing knowledge was through formal publication, which is discussed in the next chapter.

7.3.3.1 Team Meeting Minutes

With regard to storing knowledge, I noted that there was very little recording of team meeting minutes. I found this lack of converting the tacit knowledge into explicit knowledge objects rather informal compared to my biographical experiences in other management meetings and corporate board meetings, where discussions and decisions are meticulously documented for legal and accountability reasons. I was very tempted to offer myself as the team minute taker; however, this would have imposed my biases on the existing team dynamics and KM processes. Instead, I managed my dual hatted role, and decided that my ethnographic researcher role would take priority over my team member role, and so decided not to intervene.

The result was that despite this informal meeting process, and limited documentation of team discussions, the team was a very effective research team in the faculty (Case-Study-University, 2011). This is because in the team meetings, participants in the most suitable position (with expertise, time, interest etc.) would voluntarily take on responsibility for progressing particular actions rather than the task having to be delegated directly. Meeting discussions revealed the individual proactivity, with examples such as:

"I looked into the idea of book sharing, and suggest we try…" (Lucy)

"I think the best time to meet that suits their international time zone is…" (Wal)

"The book publishing options appear to be …." (Paul)

Such laisse-faire management processes may not work in all teams; however, in this case, with highly motivated, highly skilled knowledge workers, it gave the team meetings an informal feel. It was mentioned to me several times in participant conversations and during the interviews that "we are there because we want to be there, rather than being forced to be there", and this keenness mostly resulted in the participants reporting they had progressed the (untracked) task. This contrasts notably with team meeting processes from my biographical experience, where attendees often report *not* progressing the *tracked* task, and this is recorded in the meeting minutes and subsequently rolls over on to the agenda of the next meeting. The case study team seemed able to mentally remember who was doing what, and participants were motivated to actually complete the task, therefore formal minutes tracking delegations would actually have reduced team KM capacity by investing precious resources into what would have been a redundant task. On reflection, I am glad I ignored my biographical biases and stood back to ethnographically observe this team meeting "knowledge storage" process, in order to report this finding.

7.3.3.2 Team Correspondence

The knowledge correspondence within this team context was a combination of both tacit and explicit knowledge. The participants would collaboratively share their tacit knowledge in team meetings, following the Nonaka Spiral (Nonaka, 1994), as illustrated in the literature review, and their ideas would subsequently convert into forms of explicit knowledge that could be stored, such as draft documents or emails.

The storage of this knowledge was made more challenging by the fact that this team operated as a form of matrix organisation, whereby the participants were only focused on team activities for a part of their day, yet each participant sought to share their own particular perspectives on the

multiple issue and projects being progressed within the team, and also had to manage their own KM storage process. Whilst the responsiveness and adaptability of matrix teams have long been recognised (Cockburn & Smith, 2016; Davis & Lawrence, 1978; Pakarinen & Virtanen, 2017), one challenge is capturing individual capabilities and motivating all to respond cooperatively to the complicated and dynamic environment (Bartlett & Ghoshal, 1990; Smith & Cockburn, 2016). In this case, what often resulted was a long and cross-threaded email chain, as each participant did a "reply all" to the original email, and/or a "reply all" to another's response. To assist with this team KM communication and storage issue, the SharePoint technology was experimented with towards the end of my data collection period.

7.3.3.3 Electronic vs Paper Storage

The participants used a variety of ways to store their knowledge. Wal stated that he "preferred to store his knowledge in electronic form, in a structured way, and ideally striving for a paperless office". By contrast, Ruby preferred to store critical knowledge in a physical paper form, filed in a bookshelf or locked steel cabinet, so that the knowledge objects and artefacts could be secure yet easily retrieved for future knowledge sharing purposes.

Owen confessed to using post-it notes to manage actions, as "it is more expedient" although he lamented: "I don't have a record as once completed it goes in the bin". He also admitted that there was little data synchronisation between his iPad, university PC and his home PC, sighing that "It's a dog's breakfast" because "I'm not good at archiving". However, Owen had recently adopted the cloud storage tool drop-box because he could then access the master files from all PCs and "didn't have to worry about doing the synching". That is, technology development had resolved his problem of synchronising his data between his various devices, which reveals the contemporary, integrated relationship increasingly occurring between the KM process and

technology dimensions. Some team members found Dropbox useful for sharing files. Lucy reported: "I use drop box for sending large files, rather than clog up my email. I just upload the file to the cloud for sharing. It works for me, as my collaborators and I can always access the latest electronic version of the file". All participants used a combination of computer hard-drives to store and backup their data, and Paul and Dave also used a portable computer hard-drive as their primary electronic storage repository.

Paul's knowledge storage process was both electronic and paper, and Paul tended to utilise an external hard-drive as his master repository for all his knowledge. Paul considered he lacked ICT skills to ideally support his KM storage process activity. He explained a dramatic incident when some years ago he accidentally lost all the data from his hard-drive with catastrophic effects, and since then he had been more mindful and diligent in making backup copies of his master hard-drive although reluctantly admitted it had been some time since he had last backed up his hard-drive, and that loss of the drive at that present moment would cause a significant setback to his work.

Wal, Paul and Owen explicitly admitted to relying on the University corporate ICT system to perform the knowledge storage process for his email inbox, yet in fact all participants would benefit from this organisational storage process. Paul disclosed that he had a large number of emails stored within his inbox, which amounts to a substantial body of his work, and he was relying on the university system working to back up his emails. Both Wal and Owen had similar views.

The combined team storage of knowledge was a critical practice for the construction of KM capacity. Both electronic and paper forms of knowledge storage were used by all participants, although again each participant reported preferences in their practice. It was evident that a large

amount of research team knowledge was stored in electronic form, and electronic storage media were widely used by all members of the team. This also included some participants strongly advocating the use of portable hard-drives for transferring data between the various computers they worked on, and also for keeping regular backup copies of their master files.

Most members of the team worked with both electronic and paper storage systems. As discussed in the office photo analysis, Lucy liked keeping specific paper records stored in colour-coded folders, for easy and organised retrieval. Often the paper documents were filed in an order, usually based on similarity of content or application (i.e. paper files and books on one particular topic all filed in the same area). Emma also used a colour-coded folder system. Interestingly, contemporary electronic folders do not seem to utilise this "colour-coding" aspect that seems useful in some physical storage systems.

The research team did not have a central knowledge store, although as discussed in the technology dimension, they were experimenting with SharePoint. The participants assumed a knowledge storage practice where each individual stored their own records in their own filing systems, according to their own design. As would be expected, the majority of content in each researcher's knowledge store seemed to be most relevant to their respective research specialisation and interests. This method seemed to be effective, and even quite robust, as demonstrated when one member (being unable to retrieve a particular team file) emailed out a request to the team for assistance, and the document in question was emailed back soon thereafter, sourced from within the responding research team member's private storage system.

Each participant also had slightly different data backup practices, with some endeavoring to do backups daily, others weekly or as opportunity permitted. Most used some form of external hard-drive, although some were finding email (in the form of attachments) or cloud storage increasingly helpful. In effect, then, the research team operated a decentralised knowledge storage

system in the sense that backup copies of important documents were stored on completely separate systems. This effectively constructed the capacity of an ad-hoc form of data redundancy occurring within the research team, even if this result seemed to have originated more by organic evolution than by design.

This knowledge storage and accountability practice seemed to work well, with task progress exceeding the strategically directed performance expectations on the team. The lack of formal minutes and central storage did limit the amount of formal, explicit documentation detailing team discussions, actions, and progress. However, removing the shackles of structured bureaucratic management practice seemed to instill a creative, free vibrancy within the team culture. Interestingly, this more laissez-faire KM practice seemed to construct the cultural capacity of a collaborative team spirit, which is likely to have contributed to participants acknowledging that the team was a pleasure to work with.

7.3.4 Using Knowledge

This subsection explores *how* participants engaged with the use process of constructing KM capacity including the digital and publication processes by which participants use knowledge to construct their KM capacity.

7.3.4.1 Digital Knowledge Use

All participants were voracious users of knowledge as it formed a key aspect of their livelihood as academic professionals. As discussed in the create and improve sections (7.3.1 and 7.3.2) all participants were quite skilled at sourcing existing knowledge from various knowledge repositories for use in their own KM constructions, in particular digital sources. These digital sources of stored knowledge included searching formal repositories such as the university library electronic databases of academic research journals, and “Google Scholar”. Participants used the

latest knowledge of their particular specialisation to further engage with the organisation and the network as subject matter experts. That is, participants used a large amount of digitally sourced knowledge to inform their individual and team research interests.

7.3.4.2 Construction of Publications

One particular, context specific use of participants' knowledge use in 2011 was the construction of formal publications in their specialist knowledge area. These publications were shared with their network, as is discussed in the share section (7.3.5). However, with regard to their use of knowledge, team members would collaborate to construct academic publications, be that conference papers, journal articles or books. In one example, for the construction of an edited book publication, each participant used their particular knowledge insights to develop academic contributions within the various book chapters. This practice applied the participants' knowledge to a certain topic and theme and resulted in that knowledge being stored (in book form), shared (through book sales and distributions) and re-used (presumably somewhat by the readers, and also by the participant authors in subsequent publications). In this way, the research team members' knowledge was used to construct KM capacities within the team (Matthews, 2012) and also beyond the team across organisational and network levels.

The participants were also actively seeking to use their specialist knowledge on a team project or industry-based research consultancy, whereby their research insights could be applied to produce further outcomes. During the 2011 timeframe, various project applications for the research team's knowledge were developed by the team and these avenues were still being pursued at the close of data collection. Participants' specialist knowledge was also used in performing their teaching roles, although this KM activity was not explored further in this study. Therefore, whilst there is evidence to support the existence of participant processes to use knowledge, this was the

least observed process, and it was limited to the construction of the book chapters. However, overall, participants used their specialist knowledge to construct the KM capacity to perform their professional duties.

7.3.5 Sharing Knowledge

This subsection explores *how* participants engaged with the share process of constructing KM capacity. The KM share process was considered on three levels: the network, the organisation, and the team.

7.3.5.1 Sharing at the Network Level

Sharing of research team knowledge externally to the broader network level was mainly through achieved formal publication of research findings and insights. Sole authored or collaborative research publications, and KPI reports to the university management, were the main formal contributions to shared knowledge over the 2011 period, and each individual member was actively striving to develop new knowledge and publish it. However, each participant reported sharing their knowledge slightly differently. For example, Paul reported many methods for sharing knowledge, with his most formal method being the publication of conference papers, journal articles, or book chapters containing his insights and critical thoughts on various subjects within his expertise. On the other hand, Lucy also utilised less formal processes of knowledge sharing, using technologies such as email or telephone to talk with peers before eventually publishing, and she attributed this preference to her introverted nature, and her structure (J) desire to have some record of the actions determined in the knowledge sharing exercise. The sharing of knowledge in the combined team occurred between individuals within the research team in order to co-construct the research capacity of individuals within the team. To share their knowledge, a mix of both

electronic and face-face methods were used by participants and as a result, knowledge was effectively shared both within and beyond the team through both parallel and series connections.

7.3.5.2 Sharing at the Organisation Level

Sharing of knowledge with the university organisation was largely achieved through formal reporting on the progress of the team's Key Performance Indicators (KPIs), in the form of a monthly report delivered to the faculty. This report served to inform the higher management that the team was performing productively to deliver the research results that the organisation valued, with the most highly valued activities being publications, consultancies and external grant funding. It was this organisational valuation of team activity that ethnographically highlighted to me the formal relationship between team KM construction and various forms of capital, which is explored in the next chapter.

7.3.5.3 Sharing at the Team Level

Within the team, knowledge sharing was achieved by maintaining ongoing discussions with various other members of the team, continuing to construct capacity on research practices, insights and applications as required to resolve issues and tasks and to move the team projects forward. Also, the more experienced research team members naturally took on a knowledge sharing/mentoring role, nurturing and training the less experienced team members through the research team activities. This process is detailed in the literature (Nonaka & Toyama, 2003) as a socialisation practice (Nonaka, 1994) for transferring knowledge. Technology dimension tools facilitated this knowledge sharing practice including email, Skype video-conferencing, and the mobile telephone. Wal utilised the iPad app Survey Monkey on various occasions to gather collective team views on discussion points.

Interestingly, despite all the members of the research team having offices within 500 meters of each other, a large amount of personal interaction and knowledge sharing was conducted via either phone or email. Some members considered the telephone as being a more efficient knowledge sharing practice than email, as it is faster to talk than to type. Others preferred email, as it stored an auditable thread of the discussion in the email trail. Sometimes, a combination of the two practices was utilised, with knowledge being shared verbally over the telephone, followed by a written email to formalise the discussion points.

Even in the monthly face-face meetings, it was common to have a team member telephone in, rather than be there in person. The university had several conference rooms containing telephone ICTs with loudspeaker and microphones to enable this, again demonstrating the close relationship between the KM process and technology dimensions. This remote knowledge sharing interaction did not seem to adversely alter the team dynamics or discussions. In some ways, the team meetings functioned similar to a Community of Practice, where knowledge is shared within the group, to build the overall capacity of the group (Wenger, 1998).

During 2011, the research team discussed utilising video conferencing technology, and in 2012 this knowledge sharing capacity was tested via computer software such as Skype, or the university equivalent Zoom. Video conferencing use was increasingly used toward the end of data collection, as it enabled remote members, such as Emma, to participate in meetings without spending resources on travel. This reality highlights the evolutionary impact that Information Communication Technologies (ICT) has made on team interactions and knowledge sharing activities. It follows a prediction made by the Dynamic Impact of Social Connectivity (DISC) theory (Matthews & Danaher, 2011) whereby ICT connectivity can effectively reduce the physical distance between individuals to a face-to-face equivalent, and so ICT connectivity can facilitate KM practices (Matthews, 2012).

On reflection, it is important to reiterate two things with regard to the team knowledge sharing process. Firstly, in this academic context, the highest valued form of knowledge sharing was through formal publication within the network level. This expectation is culturally and organisationally embedded through the practice of formal conference proceedings, journal articles, or book publications with the organisation and network level placing different value on the publisher details.

Secondly, this publication culture has been influenced by the fact that, until the knowledge is formally published, it is difficult and legally risky to define ownership of the knowledge. For example, a leaked insight can be "stolen" by an unscrupulous researcher who is given credit for work that is not their own, and there have been many disputes over "invention priority" in the past. After formal publication, the knowledge is almost freely distributed, on the understanding that future users of this knowledge will cite the source of the formal publication. Therefore, it is within this academic context that team knowledge sharing was undertaken, which explains why the team favoured the formal publication method for their process of sharing knowledge. Prior to formal publication, the team had such implicit trust, confidentiality and respect that there were minimal barriers to informal knowledge sharing within the team. Consequently, the right knowledge got to the right team members at the right time (Riege, 2005), so as to enable team KM capacity.

7.3.6 Reflection on Participants' KM Processes

Reflection on the above participant data reveals that each member of the research team employed a variety of CISUS processes, yet all of the approaches were effective in constructing KM capacity both for the individual and the team. Yet the unique KM CISUS processes one individual deploys to construct their personal KM capacity may be counter-productive for another. Whilst this study highlights this KM process diversity, further research should be undertaken to

understand more fully the influences and impact of this KM process diversity, including further exploration of the influence individual personality preferences may have.

7.3.7 Reflection on the Team's KM Processes

The combined team CISUS processes reveal a diversity of participant processes interacting together. The CISUS survey data of RQ1, triangulated with my ethnographic observations, provide evidence that in contrast to participants' personal KM, the team KM processes were on a slower cycle, being weekly-monthly, due to the infrequency of the team meetings and interactions. Yet the team KM tended to have deeper insights, incorporating the multiple perspectives from the constructive, collaborative team discussions.

Words to the effect that "the team was more than the sum of its parts" were repeated in several participant interviews, meaning that the combined team KM processing effect generated a greater KM capacity than the individuals could have achieved working alone. Drawing on the specific CISUS process evidence detailed above, each participant brought their unique KM dimensional attributes to the table. It was through the participant interaction and socialisation (Nonaka & Toyama, 2003) that the team collaboratively co-constructed KM capacity to iteratively improve insights and implications related to their specialist knowledge. The team "fed" and "bounced ideas" off each other, sounding things out, and effectively working through the "six thinking hat" processes (de Bono, 1985). The combined expertise and knowledge specialisation of all participants were integral to team capacity building, and the final knowledge construct was bigger and stronger than the participants would have produced by working alone over the same timeframe. I refer to these phenomena as the "collaborative co-construction of KM capacity", which is explored further across the other KM dimensions of this RQ2 analysis.

7.3.8 Conclusions about the Process Dimension

In conclusion, this section has analysed various data sources to address the process dimension aspects of RQ2 as shown in Figure 5.1, in particular how the participants proceeded to create, improve, store, use and share their knowledge within the context of the research team to construct KM capacity The analysis supports the CISUS framework as introduced in Chapter 2, and discussed how the diversity within the KM processes utilised by participants collaboratively co-constructed the overall KM capacity of the team (Matthews, 2015b) and produced the positive outputs that are discussed in the next chapter.

7.4 The Human Dimension of KM Capacity Construction

The human dimension influences *how* KM capacity is constructed, as is considered in this section. RQ1 analysis revealed some deeper level diversity among participants, including in their knowledge process outcomes (Wordle), their individual MBTI preferences and "ambimindedness", their KM office technologies, and context networks (Mandala). The team's deeper level diversity influenced the team performance (Cheruvelil et al., 2014), and each participant's human dimension profile contributed and co-constructed the collaborative KM capacity of the whole team. The human dimension influence of participants' knowledge specialisations and MBTI personality interactions in constructing this KM capacity is discussed below.

7.4.1 Knowledge Specialisation Influence

One aspect of the human dimension that influences KM capacity is the subject matter that one specialises in. The Wordle data was analysed in Chapter 6.3 to analyse what knowledge the team was processing, and the deeper analysis distilled (by selecting only the top three words used

by each participant). The team knowledge specialisation was "Research, Collaboration, Learning, Education, Transforming, Australian, Sustaining, Training, Literacy, Early-Childhood, Knowledge, Management". These Wordles were analysed in detail in a subsequent publication, which noted that the participant knowledge being managed was related to the research space of educational capacity building (Matthews & Danaher, 2015).

Thus, the result of the further Wordle analysis reveals that the human dimension within this team seemed to have self-selected a knowledge specialisation, and this overall team knowledge specialisation constructed the specific KM capacity focus of the team. Whilst this team specialisation was on the broader topic of educational capacity building, each participant's unique and specialised perspectives were socialised (Nonaka, 1994) and valued amongst the team, leading to collaborative co-construction to create new insights that improved the team's KM capacity. The actual processes of constructing this KM capacity were considered in the previous process dimension section.

7.4.2 Participant MBTI Influence on KM Capacity Construction

The intention of this subsection is to consider how the MBTI aspects of the human dimension influenced the KM capacity of the team. Greater understanding of how the human factors, such as individual personality preferences, could benefit KM operations (Quinn, 2006). This study found that the I-E, S-N, T-F and J-P dichotomies of the MBTI dynamics within the team influenced how the team constructed its KM capacity across the individual, team, organisational and network context levels. Being a collaborative team, these dichotomy diversities were "politely and professionally" managed to include and involve all perspectives. The combined team MBTI string diagram from Figure 6.24 is further analysed below in Figure 7.2, to help to consider how the

various participant MBTI preferences interacted with one another as a team to influence the construction of KM capacity.

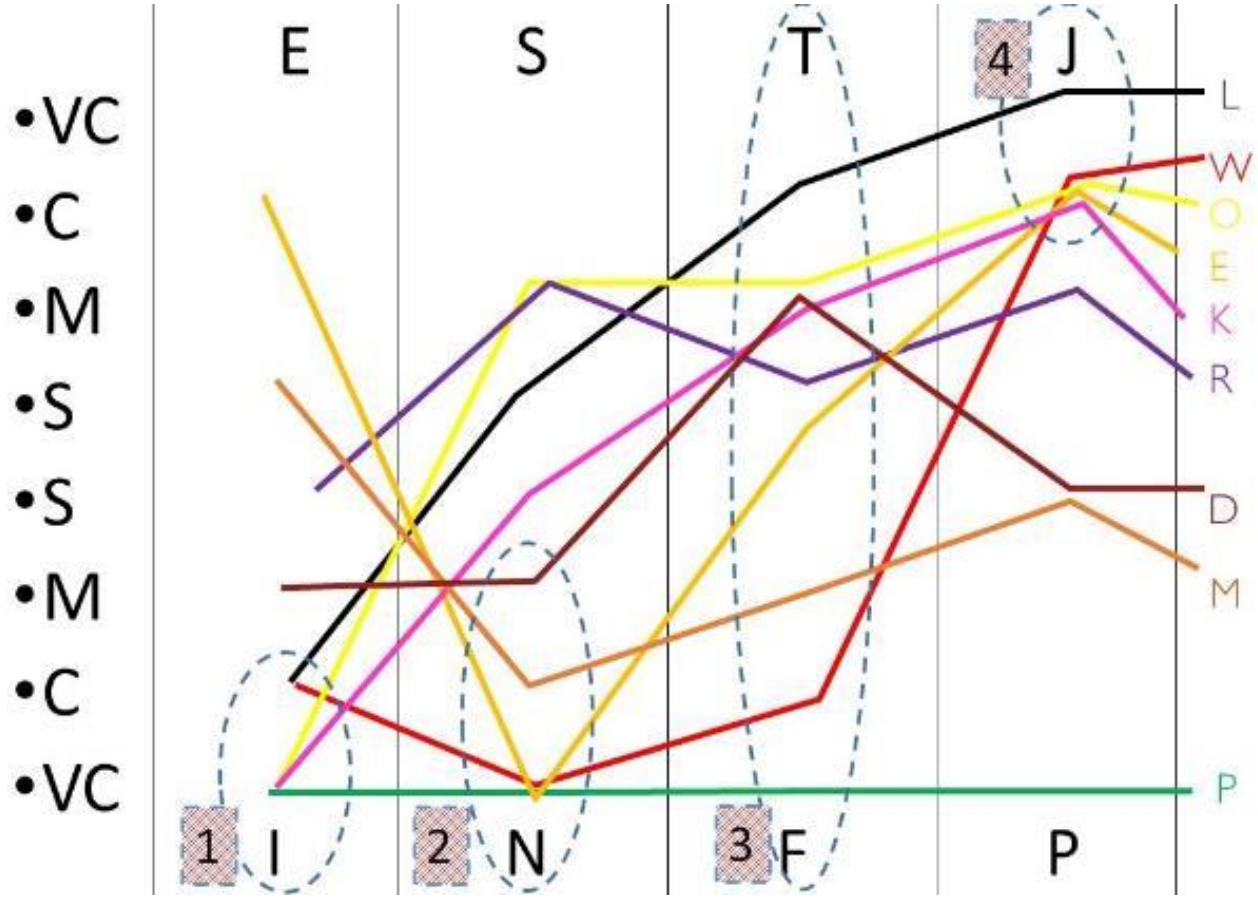

Figure 7.2 The MBTI Type Preference Influence on KM Capacity

I have circled on this diagram (in the dotted blue line) four significant points of interest. Firstly, on the bottom left-hand side, more than half of the team were clear to very clear "I" introverts. Secondly, at the middle bottom, more than half the team were "N" intuitives (with three members having a very-high "N" preference). Thirdly, the team members reported having a broad balance of T-F preferences. Fourth, at the top right-hand side, more than half of the team preferred being clear to very clear structured "J"s. Being aware of these team personality preference profiles

helps to understand its unique collaborative culture, in that the "I" introverted members were happy to listen to others ideas, the "N" qualities could comprehend the big-picture value in an idea without needing every detail up front, the "T-F" balance effectively managed any conflict to be constructive, and the structured members enabled the team to deliver outcomes according to project requirements.

Another point to note was Paul's distinctive preference for INFP, as shown by the green line at the base of the diagram, which can be seen to contrast with the more "SJ" preferences of Lucy and Wal, who reported preferring more structured approaches to completing tasks. Looking at the office photographs discussed in Section 6.5.1, Paul's INFP preference influenced his office technologies and processes to be more fluid and less structured than Lucy and Wal's. That is, Paul's NP preference seems to reflect a more open-ended, organic, intuitive approach to completing tasks (Matthews & Danaher, 2013) , thus influencing his construction of KM capacity.

On 24 January 2011, I presented this combined team MBTI profile to all team members during Focus Group 1, where participants validated further their preferences and further triangulation of the findings occurred (Hammersley & Atkinson, 2007). Team members were very interested in how some individuals had quite a different MBTI preference from themselves. In this way, these MBTI research results asisted the team with their own personal development as well as the team development, enabling them to understand better one another's preferences, and so work even better together in the future. The MBTI insights thus assisted team KM capacity constructions from that point on. For example, the team members noted the very clear intuitive (N), feeling (F) and unstrutured (P) preferences Paul had, and this realistion made the other team members more aware of why Paul exhibited his unique, yet highly effective and productive, KM capacity.

The impact of these human dimensional similarities and differences influenced participants' construction of KM capacity in a number of ways. Thus, the MBTI process provided real evidence of an aspect of that diversity. This personality diversity was surprising, given that members had self-selected each other. I had expected to see similar personality types within the team, as there is evidence to suggest that groups (teams) tend to select members based on perceived personality similarities and sameness (homogeneity and isomorphism) (Sangster, 2011). However, it has also been highlighted, by Kozlowski and Bell (2003), that the actual task and the amount of member interaction may require different personality compositions for effective performance. One reason for diversity is to reduce group think, which can occur when all team members have similar ways of looking at something (Sangster, 2011). Therefore the combination of personalities enabled this team as a whole to offer collaboratively a variety of insightful educated opinions and output on the team's focal research topic.

Incidentally, despite this wide variety of personalities, there was little personal conflict in the team. Participants self-selected to collaborate on scholarly projects, and their diversity of personal approaches and specialist knowledge led to collaborative co-construction, rather than conflict. The resulting team output productivity that earnt faculty recognition of team achievements (Case Study University, 2011), which was explicit evidence of team performance. Thus, the diversity of MBTI preferences led to different KM approaches, knowledge specialisations and perspectives, which, when collaboratively and cooperatively combined, bolstered the overall team KM capacity.

7.4.2.1 E-I dichotomy on KM capacity

It can be seen from the Chapter 6 results that most of the team were introverted, and this had implications for how the team constructed its KM capacity. A previous study hypothesised that

greater diversity in the team extroversions would lead to conflict, but its findings did not support this hypothesis (Mohammed & Angell, 2004). Similarly, none of my study data suggests that the E-I dichotomy causes personal conflict. There could be three factors that eased any E-I tensions to prevent them from causing conflict. Firstly, the team was biased toward the I dichotomy, as shown above, so any "E effect" from Emma or Marge was outweighed. Secondly, with the team culture being professional and collaborative, all ideas of extroverted participants were listened to and discussed, so extroversion created only constructive conversation, not conflict. Thirdly, on a surface level, the team's demographic similarities may have eased any E-I tensions, as the team could relate to each other well, avoiding cultural misunderstandings and inappropriate behaviours that might otherwise have caused conflict. Therefore, the E-I dynamics of this team were considered healthy, which assisted in constructing KM capacity.

There are some specific examples here of how MBTI preference influences how participants constructed their KM capacity. For example, Lucy stated: "I am aware of my introverted nature, and often prefer to work by telephone or email to avoid face-face meetings". That is, Lucy utilised technology tools at her disposal to enable her to share her thoughts and ideas without causing stress to her introverted nature. In this way, Lucy had found a technological solution to work around her personal preference in her relationship with the world, and based on the evidence of her KM productivity (publication outputs and knowledge network relationships), her "I" solutions to manage the "E" aspects of her role proved to be quite effective.

For Emma, who was the only extrovert academic in a team with 56% clear-very clear introverts, it was almost the opposite situation. Due to the nature of her work Emma was not often at the case-study site, but often tele-conferenced into meetings, rather than meet face-face. The team was always naturally considerate to including Emma's views, in the form of questions such

as "What do you think about that, Emma?" or "Any other comments from your perspective, Emma?" Therefore Emma was usually given a "full seat" at the table, even if she were not attending physically, and encouraged to express here extroverted ideas. I did not ask Emma in the interview if her extroverted preference ever felt stifled by her virtual team meeting presence. However, given Emma's "T" preference and familiarity with the team, she would have spoken up (and been listened to) if she had felt the need. Had the team been of the opposite preference, where it was an introvert (or even an extrovert) working virtually with a team of clear-very clear extroverts, the virtual participant would have barely gotten a word in. In that case, achieving the same collaborative inclusiveness would have relied on the ambimindedness and professionalism of the team to engage patiently with the virtual participant.

Accordingly, the introverted nature of this team assisted its KM capacity culture to be collaborative and inclusive, and the MBTI analysis provides evidence to support my ethnographic observations on this. My ethnographic observations suggest this "I" bias of the team (perhaps combined with the "J" preference bias) may have influenced the team toward writing publications as their main outcome of constructing KM capacity. Whilst some extroverted KM activities, such as consulting or presenting at conferences, were completed, I consider them to be less significant KM achievements than the publications. Therefore the introversion preference definitely had a significant influence on *how* the team constructed its KM capacity.

7.4.2.2 S-N dichotomy on KM capacity

Lucy stated that she preferred to leave the more N style tasks, such as big-picture strategising, to team members whose preferences attracted them to those N tasks. With her strong STJ preference, Lucy recognised that:

> I'm not so good on the strategic bigger picture stuff and I'm good with details. So where I naturally sit is I'm just getting on with the job, doing the detail - the day to day really nitty gritty stuff. I can be at strategic level, but I tend to shy away a little bit. It's not my preference. I can do it. It's not as interesting to me perhaps, or as engaging. But I do agree the faculty needs both, so I fit in a place, and I can do the other, but it's an area that I know I need to develop.

The S-N dichotomy spectrum of the team was weighted toward "N", with three participants with very clear intuitive "N" preferences, countered by only two medium (Lucy and Owen) and one slight (Ruby) "S" sensing (detail orientated) preferenced participants. Upon my becoming more aware of this MBTI "N" bias, I noted it was often Owen or Lucy who would often seek a more concrete, specific details, such as "So, who is going to be working on the editing aspect?" or "What time are we meeting them?". Balancing these "S-N" details and ideas was crucial to participants collaboratively co-constructing their KM capacity and achieve tangible outputs and outcomes.

Further evidence to support the above "S-N" combination working together to achieve the overall team capacity was provided by one special case. At a team meeting on 12 April 2012, Owen and Lucy, who were the only two "S" preferenced members of the team, were the two facilitators, which precluded them from providing detailed solutions and outcomes. These two "S" preference facilitators appeared to grow increasingly frustrated as the remaining "N" preferences meandered along in "high level idea" mode, avoiding delving into the details required for decisions and actions. Several times the facilitators tried to lead the participants to make a specific decision, and each time the discussion would veer off on some conceptual tangent. In the end the facilitators

ran out of time and moved on to their next topic. This special case showed the value of having an S-N dichotomy balance in a team.

Following that observation, I took more notice of how the two "S" preference participants would gently nudge the team to make a firm decision for tangible action. Paul alluded to awareness of this situation:

> If you had all big picture people you wouldn't get anything finished. But if we had all small detail people I don't think we would get much done either because there wouldn't be a sense of the wider way things fit together.

So in this case study team, the S-N diversity was usually effectively balanced, providing a positive combination for team productivity, which influenced *how* the team collectively co-constructed KM capacity.

7.4.2.3 T-F dichotomy on KM capacity

The broad cross-section of the T-F dichotomy spectrum was evident in the combined team MBTI string diagram in Figure 7.2, and this diversity also seemed to keep the team in balance. All participants were mature, professional and courteous to one another, so the "T" preferences were able to soften their frankness, and the "Fs" felt safe and supported enough to mention any concerns or frustrations that they might feel. So, whilst the preferences were broad, the team seemed to work in the middle of the dichotomy, at "slight-medium" clarity, as I did not observe any angry outbursts, tears, snide remarks or back-stabbing politics, which can be exhibited in other team contexts. The team was harmonious as the team members realised that by collaboratively performing they would achieve more. The team's "competitors" were external to the team and so I had less visibility of those external team MBTI dynamics, although I did perceive it caused far

more T-F tension than ever occurred within the team context. So the professionalism of participants and their vested interests balanced their T-F diversity in constructive ways to enhance team KM capacity.

One example of this T-F balance being constructive was during two separate, personal incidents that resulted in both participants requiring a period of hospitalisation. Rather than causing chaotic or nil drama, as might occur in a high "F" or "T" team respectively, in this case there was a balanced reaction from the team. As such, both incidents were discussed in a concerned, yet calm, manner. Furthermore, perhaps through the professional development provided by this study, it was especially noted that personality preference of both hospitalised individuals was explicitly considered. The effect was that respectful visitations were arranged amongst the team in accordance with the introverted preference of both individuals, and different gifts were sent to satisfy their different T-F preferences. Following this brief team discussion, participants moved on with their team tasks, and there was only a minor mention of those events in subsequent team meetings. This example shows how the teams' "T-F" balance enabled the construction of KM capacity tasks to be maintained whilst also providing appropriate attention to the team members' welfare.

7.4.2.4 J-P dichotomy on KM capacity

With regards to the "J-P" preferences of the team, 56% of team had a high-very high "J" preference. The "J-P" dichotomy diversity of the team influenced the structuring of the KM capacity constructions. For example, Lucy was quite strict in neatly structuring her own research management, as was evident in her office layout (refer Section 6.5.3) and she was proactive in her research topic publications. Lucy mentioned that she found the more laisse-faire management of the team a little frustrating, indicating a preference for more systematic work, and mentioned that

she "found delivering on last minute deadlines very challenging". To overcome this, Lucy "accepted that not everyone is as structured as I am, and so I select tasks that I can go away and progress with in my own way". In this way, Lucy did tend to self-select more "SJ" tasks within the team, such as editing the book and managing book sales, although of course she also contributed to the team's scholarly work.

Lucy's KM capacity structure is typical of an "SJ" as reported in the literature (Myers et al., 2003). Also, "individuals with preferences for Sensing and Judging (SJs), enjoy a structured environment incorporating security and stability, work that is systematic, and a workplace where routine is common" (Quinn, 2005, p. 79). The SJs tend to safe guard tradition and convention; even the language used by SJs reflects an orientation to the past, to traditions, and the conventional manner in which things have always been done. SJs are probably the ones to assert, "it has always been done this way." "These descriptions indicate SJs might experience difficulty when approached by knowledge engineers to contribute knowledge for inclusion in knowledge management systems" (Quinn, 2005, p. 75). However, whilst Lucy did prefer structure, her publications are evidence of her ambiminded ability for creative "spark" of original inspiration, as was discussed above.

Meanwhile Paul, the dichotomously opposite with a very clear "NP" preference, appeared to have a less structured (based on his office photo evidence) construction of KM capacity, but he was still very effective. Furthermre, Wal, whilst being a very clear "NJ", was an early adopter of technology and new software applications, and seemed to enjoy exploring new processes and technologies to enhance his KM capacity. This suggests that the participants' "J-P" preference may visibly influence *how* KM capacity is constructed, but may produce similar functional results. Given the end state of KM capacity is about results and outputs, as is discussed in the next chapter,

the combination of participant diversities collaboratively co-constructed an effective J-P balance to their performance.

7.4.2.5 Overall MBTI Preference Diversity

In terms of the human dimension, the MBTI and demographic analysis provided a viable analytical tool for exploring participants' construction of KM capacity in this case. The RQ1 analysis conducted in Section 6.4 provided insight into the participants' MBTI preference that RQ2 further contemplated in order to consider the personal team dynamics and diversity, and how this influenced the team's construction of KM capacity.

This diversity of personality preference within the team offered advantages through variations on the team perspective, thereby generating more wholistic, rounded outputs, or, as Kandy eloquently put it, "the whole team is greater than the sum of its individual members". This statement can be clarified in that each individual team member's unique KM capacities combined to contribute synergistically to build the overall team KM capacity. Whilst this situation may also occur in other teams, the unique contributions of individuals within this team to construct KM and capital was identified from analysis of various data sets in the following chapters, to support the notion that the whole team KM capacity was greater than the sum of the individual KM parts.

For example, it was observed that this team personality diversity increased the overall KM capacity because participants compensated for one another by offering their perspectives and strengths to the whole team. In these two ways (perspective and support), the overall knowledge management capacity of the team was observed to be "greater than the sum of its individual parts" (Matthews & Danaher, 2013). Further to this, I perceived that as this team's awareness of participant MBTI preference increased, resulting from my sharing of the study's findings to the team, the team's acceptance of KM capacity diversity increased. Thus, each participants KM

capacity idiosyncrasies related to their diverse MBTI preferences was valued in recognition that the diverse perspectives effecively contributed to and co-constructed the overall team KM capacity, to produce the team's outputs and outcomes.

7.4.3 Team MBTI Influence on KM Capacity Construction

In delving more deeply into the human dimension of personality, the team as a whole exhibited a "perceived personality" profile that was greater than the sum of its parts, in that the team was more than just a combination of its individual personality preferences. To support my own observations as to the overarching persona of the team and to explore it with some triangulating evidence, I adapted the MBTI diagnostic survey to seek an indicative personality profile of the team. Participants were asked to re-do the MBTI form M by responding according to what they perceived the team would prefer, as was discussed in Section 5.5.2.2, thus providing evidence of the indicative participant perception of the desired team MBTI personality preference. The participants self-identified with the team ideally operating with an E_TJ personality preference, as shown in the results presented in the combined team string diagram at Figure 7.3.

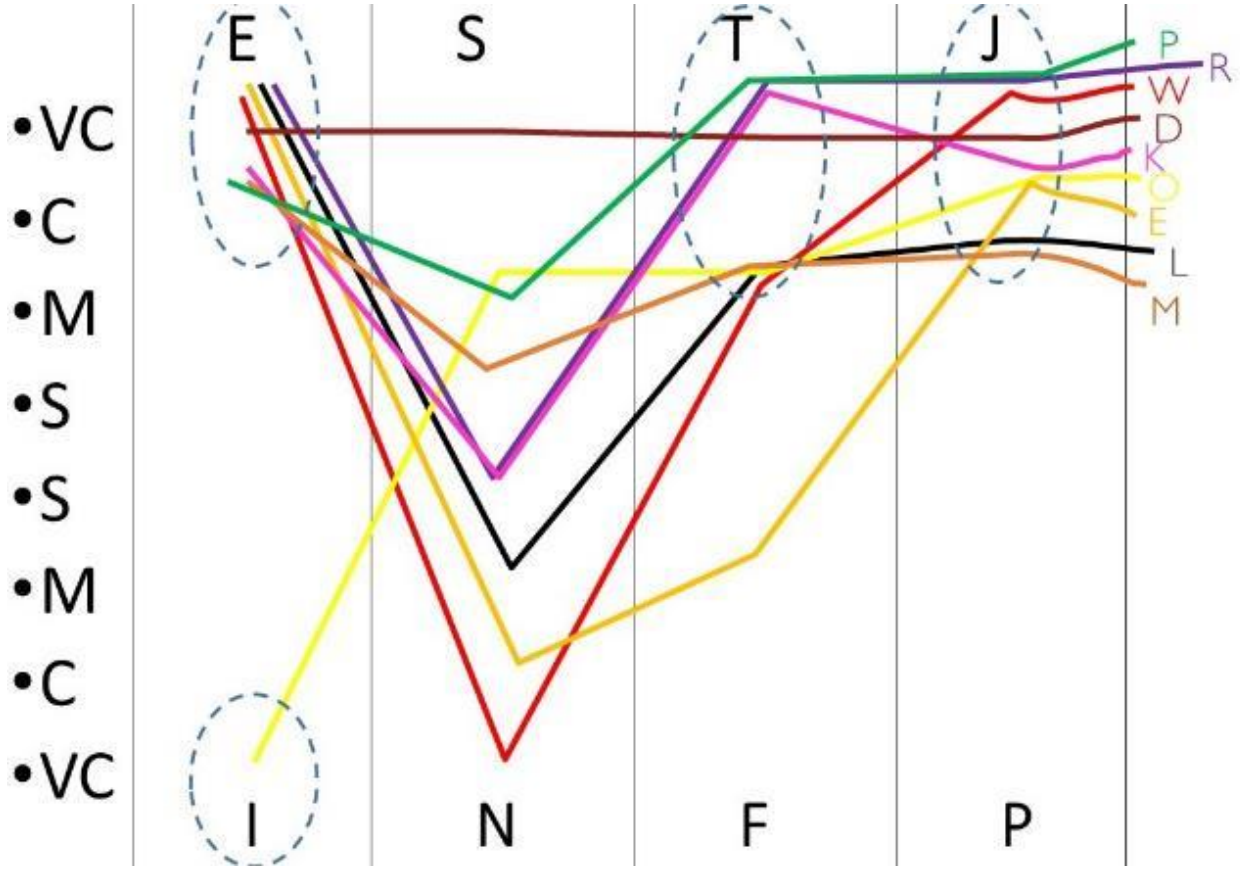

Figure 7.3 The Profile of Perceived Expectation of Team MBTI Type Preference (E_TJ)

Based on these data, I have highlighted four points of note. At circle 1, 89% of the team (8 of the 9 members) perceived that extroversion "E" was preferred by the team. The perception of the ideal team S-N clarity was quite balanced, and no clear preference stood out. Secondly in circle 2, 100% of the team considered a T preference was desirable for the team. And thirdly, at circle 3, 100% of the team perceived that the desirable team quality was towards being a structured "J". This indicates that the participants perceived that the team as a whole expected clear E and J preferences in performing team KM operations. It is interesting that the participant perception of the S-N dichotomy of the team was varied, hence it is noted with not having a preference. The reasons for this lack of clarity were attributed in the interviews to be related to the organisational desire for both big picture "N" and small detail "S" qualities depending on the task at hand.

Given this rather unified, unanimous result, the MBTI form M offered a unique insight into the overall team's human dynamic, which triangulated with my ethnographic observations far better than I had anticipated. To consider these results further, I discussed this extroverted expectation within the team, and I observed that it may be related to the need for the team to be extroverted and to share explicitly their insights and ideas in the academic public domain in order to derive most value from the constructed KM capacity, as is discussed in the next chapter.

Fourthly, an outlier in this perception was Owen, who (in the circle 4 on the bottom left of the diagram) expressed an opposite view, in that the team expected a very-high introverted nature. He explained it simply as "I just introvertedly sit down and write". As mentioned in the previous subsection, writing was the introvert's special contribution to constructing KM capacity, and Owen obviously perceived that such introverted writing was the team preference. Owen was quite accurate in his perception, as indeed each team member did need actually to go away and to deliver something introvertedly in writing, rather than just talk about it. Yet, by publishing those writings to have value, the team worked around the SECI spiral (Nonaka & Toyama, 2003) and uses extroversion to socialise those publications with the broader organisational and network peer group. So the end state expectation of the team was towards the eventual extroversion of participants' introverted thoughts on their KM specialisation topic.

Exploring the "T" thinking rather than a "F" feeling preference for the team was related to the topics being discussed, which were logical, philosophical thoughts and opinions about the educational context, from the perspective of participant KM specialisations (as described in the Wordle at Section 6.3). The team expectation was not focused on the "F" emotions around the topics, but rather on presenting logical "T" arguments founded in the academic literature and rigorous, empirical research. Only Emma perceived that a medium "F" preference would be

desirable for the team; however, I did not find this prior to her interview and so this variation was not explored further.

Exploring the perceived "J" preference within the team, again this expectation was driven by the need to structure the team's operations such that each participant understood their own role and duty within the team. Without such a structure, the team would be a mere idea or intent, with perhaps random, chaotic, informal interactions that would deliver very little team KM output. Also, it must be noted that this "J" expectation was influenced by the fact that this team was working within the context of the university, which itself had very structured expectations of team output (refer to the next section). Triangulating back to the office photographs from Section 6.5, "J" technologies assisting participants to construct their KM capacity were those to assist in managing time (calendar, diary, clock) on an hourly, daily, weekly, annual basis. According to the maxim "Time is really the only capital that any human being has, and the only thing we can't afford to lose" (Thomas Edison), all participants possessed the time management tools, skills and structure to manage their time to construct their KM capacity and deliver their respective KM outputs.

Interestingly, the team did not unanimously agree on the S-N preference or the N-T preference, instead returning a range of responses. This data is considered to reflect the diversity of the team and may be skewed by the perception of each individual's own strong preference, and what skill they brought to the team. That is, some participants provided the team with more S interaction than N, or vice versa, based on their own unique preference and skills, and this "S-N" diversity enhanced team KM capacity.

Overall, whilst this data collection process was unconventional use of the MBTI instrument, it provides insight into the team's KM human dimension, and each individual's perception of the team personality expectations.

The "Team MBTI preference" was obtained through a projected perspective of the individual's perception, which, as discussed in Chapter 4, provides a reasonable view of the participant's perception of the human dimension reality and constraints that the team and organisation expected them in constructing KM capacity.

7.4.4 Organisational MBTI Influence on KM Capacity

To support my own observations of the overarching persona of the case study university organisation and explore it with some triangulating evidence, I adapted the MBTI diagnostic Form M survey to seek a "perceived personality" profile of the faculty. Participants were asked to re-do the MBTI form M answering the questions in accordance with what they perceived the faculty would prefer, thus providing an interpretation as to their perception of the MBTI personality preference that was desired by the university faculty organisation. As discussed in as was discussed in Section 5.5.2.2, the participants were familiar and capable of "profiling" the organisation. That is, this research obtained the "organisation's MBTI preference" through a projected perspective of the participants' subjective perception, which provides insight into the participants' perceptions of reality. Consequently, an organisation MBTI personality preference was obtained to add to the individual and team profiles, and this provides insight into the team C-Z framework, a what the organisation (faculty) was perceived to be, as shown in Figure 7.4.

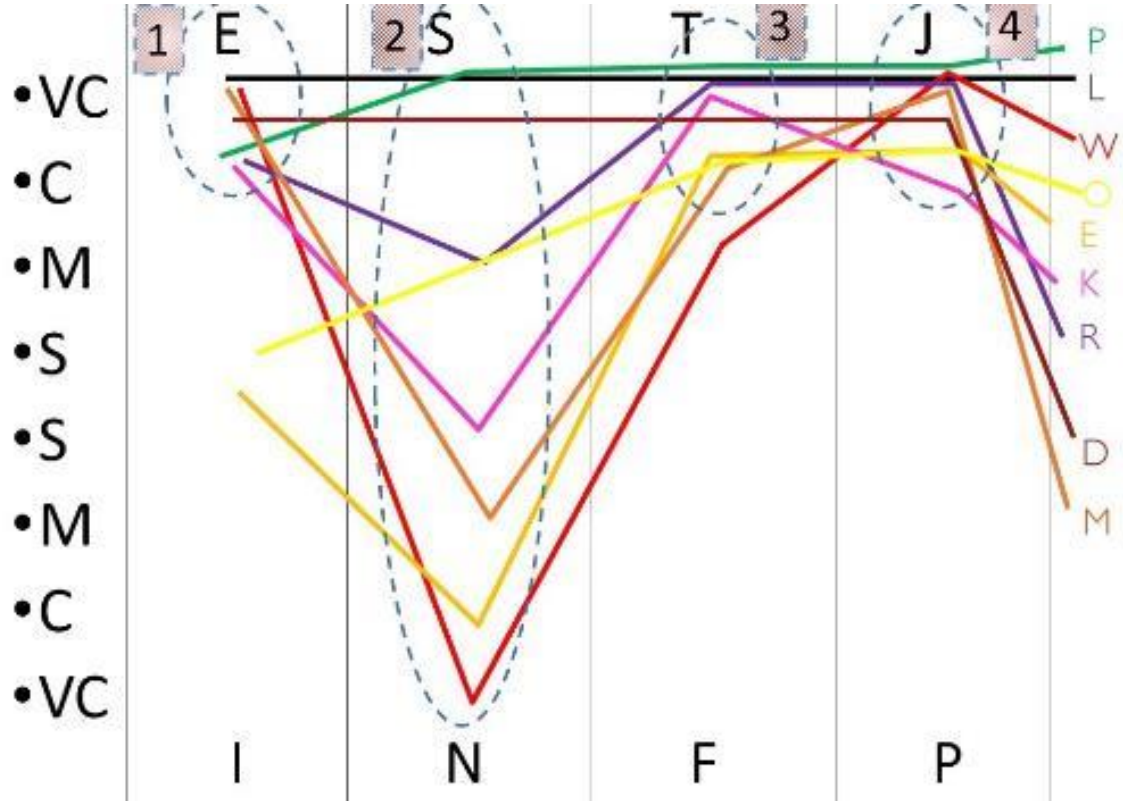

Figure 7.4 Perception of MBTI Type Preference for the Organisation (E_TJ)

Again, it must be noted that it may not be a technically validated application of the MBTI Form M to rate a "third person's personality" or in this case, an "organisational personality". However, it was pursued as a side-experiment with the MBTI form M process in this case to provide some triangulating evidence in relation to the C-Z context of the team, and the result was insightful in several ways.

Firstly, the results reveal that most participants (a clear consensus) perceived that the faculty organisation desired an E_TJ personality preference, as shown in Figure 7.4. That is, all participants perceived that the university organisation would prefer them to exhibit extroverted thinking and structured characteristics (according to the form definitions of those characteristics,

such as plan things, discuss them, be on time, etc.). It is interesting that the team perception of the S-N dichotomy of the organisation was varied, hence it is noted with not having a preference. The reasons for this lack of clarity were attributed in the interviews to be related to the organisational desire for both big picture "N" and small detail "S" qualities depending on the task at hand. My ethnographic observations support this E_TJ perception of the team and the university preference as is discussed below.

The preference toward extroversion and thinking is based on the organisation requirement for information to be explicitly documented so that there was an auditable trail of the KM process, with published policies and guidelines that set boundaries to behaviour and decisions. Little emotion is applied to making decisions, which are based on university policy justifications and expectations. The "J" structure arises from the prescribed structures within the university, such as staff positions, templated forms to fill in, and set dates to adhere to. The organisational ideal was to measure the information and output against some metric, such as in a KPI, so that it could be performance managed, all of which reflects a clear "E_TJ" preference.

Interestingly, participants did not perceive exactly the same "S" or "N" personality being preferred, as the organisation (the university) that the team operated within (the team context) was reported differently by each participant. Some thought the organisation preferred a more detail orientated "S" culture whereas others considered that more intuitive "N" big picture thinking was preferred. Averaging the individual responses would dilute the extreme S-N dichotomy that participants reported. My ethnographic observations did not allow me to make a defensible conclusion as to why there was such variation in participant perceptions of the organisational "S-N" preference. Participant perception was based on what the organisation valued about them; for some participants it was their "S" details, while for others it was their "N" big picture perspectives.

Still, this diversity of S-N perspectives is apparent on the graph, revealing the S-N variability in the university organisation.

Overall, the results revealed that all participants perceived that the prevailing organisational personality was more E_TJ. This finding also relates to the contextual dimension of the team operations. In the human dimension, though, whilst participants with a "TJ" preference had a natural fit with the organisation, the more "NF" participants had to adapt their personal MBTI preferences to suit the prevailing organisational persona, which was both implicitly and explicitly expected of them. That is, the "NF" working to the expectations of an "TJ" organisation required changes in their natural behaviour and work practices. The performance of the "NF" personalities within this "TJ" team/organisational context was further testament to their ambiminded skill to work with their non-preferred styles.

Recognition of the strengths and weaknesses of the various MBTI preferences, and the delineation of natural roles that would suit each type, seems to be accepted in the literature. It has been stated that people search for environments that fit their personalities (Holland, 1973; Lyons, 1985). It has also been shown that person-organisation fit is created in part by selective recruitment and in part by subsequent socialisation (how the organisation influences the person's value, attitudes and behaviours), with those recruits whose values fit the organisation's feeling most satisfied (Chatman, 1991). Indeed, the MBTI literature (Myers et al., 2003) reflects this by suggesting that certain personality preferences are most naturally aligned and suited to particular jobs. For example, an STJ is a more natural fit with accounting, given its structure, rules and requirement for attention to details. This implies that the NFP preference would struggle in an accounting role and would be a more natural fit in jobs within the arts or creative industries (Ibid).

However, this study raises two issues in that certain MBTI preferences suit particular jobs. Firstly, I have found no literature regarding an organisation advertising itself as "ESTJ" to attract those ESTJ personalities that would best suit them. In reality, if this particular university organisation were to advertise explicitly for "E_TJ" personality preferences it would break recruitment equity law. Secondly, this research shows that the diverse MBTI preferences can, through collaborative co-construction, lead to high performing team KM capacity, and so by recruiting just E_TJs the university would miss out on that personal richness. Therefore these two issues contradict the view that ESTJs are best employed in ESTJ roles. and suggest that the inclusion of non-ESTJs into an ESTJ role might add valuable perspectives and insights to that context, as is further discussed in Chapter 9.

The findings of this research raise two more points. Firstly, the team satisfied and fulfilled roles for both STJs and NFPs. This suggests that the task duties within a research team are very diverse, and require both big picture, intuitive thought processes that the NT preference enjoys, and also the detailed, structured work that the SJ preference likes. Furthermore, in this case, participants were free to choose their own research topic, which can also be tailored to satisfy their preference, depending on how much human "T-F" emotion and feeling they chose to engage with. Also, the researcher role can be "I" or "E" as relevant, enabling one to write in an isolated office or socialise at conferences to suit individual preferences at different times. Therefore, whilst the role of an academic researcher may be somewhat self-selecting, this case study shows that, by having both preferences working together within the one team, the productivity of the whole team was strengthened as participants had opportunities to self-select their involvement in team tasks and projects according to their own preferences.

Secondly, the finding that the overarching organisational personality was "TJ" would suggest that, as the literature suggests, the natural "TJ" preferences would be a more natural fit with the organisation. This insight was only briefly touched on during the interviews, with some of the more "FP" participants being frustrated by the "TJ" hoops imposed on their natural work tendencies. The effect of this was that the NFPs were disadvantaged by being required to adapt their own natural practices, whilst the STJs were unburdened. In some situations, when some participants had to perform in their non-preferred personality role, such as writing up a detailed report (an SJ activity) or presenting a case (a more extroverted preference), it caused stress. Herein is also a subtle research finding, namely that an organisational culture may tend toward a particular MBTI personality preference, which suits some (those workers with the matching personality preference) and frustrates others (those workers with opposite personality preferences). This alignment between individuals' preferences and organisational culture hints at a potential area for future research, as is noted in Section 9.5.

7.4.5 Conclusions about the Human Dimension

The intention of this section of RQ2 was to explore how the human dimension influences KM capacity. Firstly, each participant's knowledge specialisation was revealed by the empirical evidence provided by the Wordle analysis, showing the various interests and intersections between each individual's knowledge in terms of educational research, and how this deep, rich knowledge specialisation commonality assisted in constructing the KM capacity of the team.

Secondly, data triangulation supported the finding that both the team and the organisation were skewed towards an E_TJ preference of the MBTI. It has previously been suggested that simply being aware that a person may be of a different MBTI type and taking that potential difference into account, can greatly improve communication (Lyons, 1985). In this case, the

participants with more I_FP preferences had developed skills to adapt their own preferred methods to suit that of the team and the organisation, in order to construct optimal E_TJ capacity, a skill termed "ambiminded" in this study. I assert that participants' "ambiminded" skills enabled them to adapt their personal KM capacity preferences to align with the perceived personality preference of the context. Thus, whilst it has been shown that being *ambidextrous* can, in some cases, be a *disadvantage* (Magat & Brown, 2009), my findings suggested that being "*ambiminded*" can be an *advantage*, by enabling capacity to adapt smoothly to the various personality requirements of different KM contexts. This adaption notion has previously been shown to have a positive impact on KM capacity (Jain & Jeppesen, 2013), which is thus supported by this study.

This research has revealed that participants constructed KM capacity differently. The discussion of participant's MBTI preference diversity was discussed with the team during interviews and focus groups, as well as being ethnographically triangulated. The diversity within the human dimension influenced how each participant engaged with the process, technology and context dimensions. Participants different knowledge specialisations, MBTI preference, and perceptions resulted in each of them constructing the KM capacity slightly differently to suit their particular requirements. This suggested that an individual's MBTI preferences may influence the KM capacity of the human dimension, as individuals perform more comfortably in their preferred MBTI thinking style, although my study concluded that the development of "ambiminded skill" can be an advantage, enabling individuals to adapt smoothly to different contexts, and these findings are further explored in Chapter 8 in relation to the positive economic, cultural and social benefits generated.

7.5 The Technology Dimension of KM Capacity Construction

The technology dimension had a significant impact on *how* KM capacity was constructed in the team, which is discussed in this section. Chapter 2 literature review revealed that many KM related technologies have only relatively recently come into existence (fittings, fixtures and ICTs), and all participants were constructing KM capacity from this technology in various ways, as evidenced in Chapter 6's RQ1 data analysis of each participant's office photos. Various data sources are analysed in this section to provide evidence to further support how participants engaged with the technology dimension to construct KM capacity, in response to RQ2. These included the ICT survey to provide a descriptive comparison of participants' ICT skills and uses, selected extracts from the interviews, and triangulation with both my ethnographic observations and the office photo profile analysis findings from Chapter 6.

7.5.1 ICT Survey- Use and Skill

This subsection analyses the ICT survey data to explore how participants used the KM technology dimension to construct their KM capacity. Chapter 6 provided an office photo profile to show that whilst each participant had access to similar technologies in their office, their skills and engagement with the technology dimensions was slightly different. The ICT survey (see Appendix 7) delved more deeply into the details of how the participants engaged with their ICTs, by obtaining descriptive data to provide indicative evidence of team technology skills and usage to support my ethnographic observations.

The data were analysed by producing a scatter-plot of the results, with the Y axis showing the participant ICT skill level (nil, beginner, intermediate, advanced and expert), and the X axis showing the number of hours per week the participant used particular ICTs. The ICTs were plotted

on the graph with a small triangle denoting the participants' skill and use reported for that particular ICT, which is presented in the following figures.

7.5.1.1 Lucy

Lucy's ICT survey results are shown in Figure 7.5, reporting indicative usage mainly for word processing (MS Word, 3hr/wk at an advanced level), email (MS Outlook, 2hr/wk at an advanced level), Internet browsing (MS Explorer, 2hr/wk at an advanced level), and presentations (PowerPoint, 1hr/wk at an advanced level).

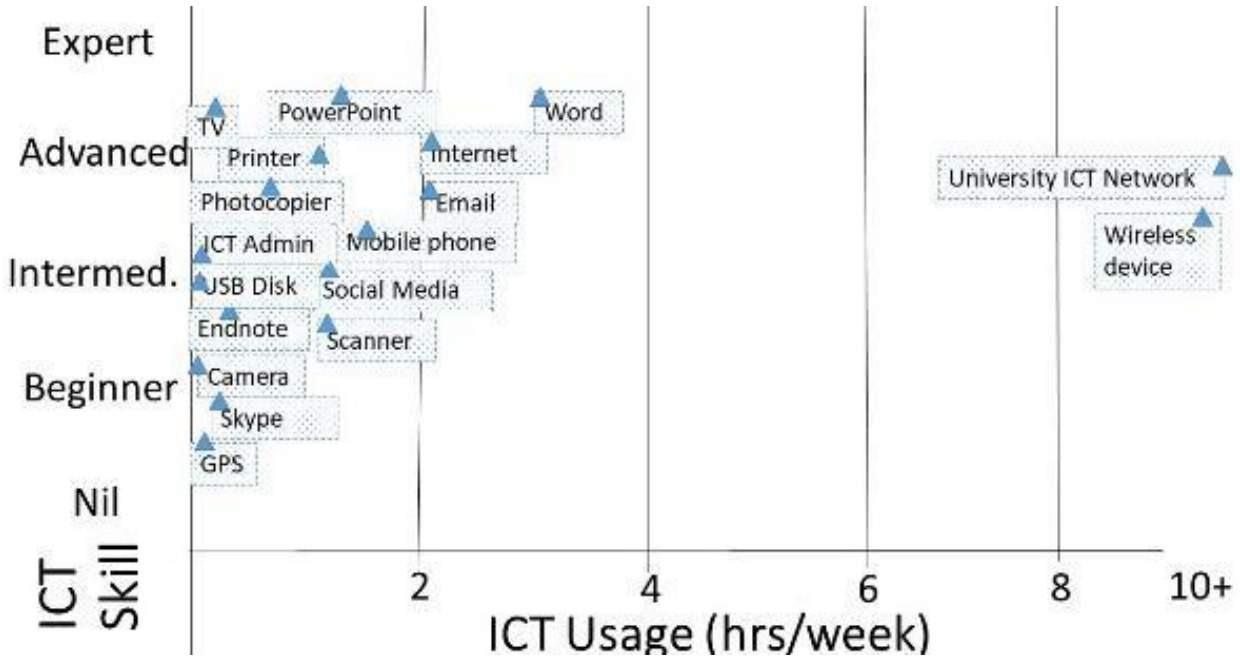

Figure 7.5 Lucy's ICT Use and Skill

This graph also shows that Lucy was a frequent, advanced user of the university ICT network (well over 10hr/wk) and wireless internet access (10 hr/wk). In the interview, Lucy explained that

she had adopted cloud storage as her preferred data storage, as it enabled her to share files with others more easily when collaborating, although she did also utilise an external hard-drive for secondary data backup. Her electronic files were used in conjunction with a colour-coded paper filing system in her office, all with the aim of storing and sharing knowledge with her peers and students.

Lucy also reported that she preferred talking over the telephone, explaining that it supported her introverted nature and was time-efficient as it negated travel time. However she only reported using her mobile cell phone for voice and text communications for 1.5hr/wk at an advanced level, and unfortunately I did not seek explicit data on her land-line telephone use in the survey. Her printer/photocopier/scanner was reported as being used for 1.5hr/wk total at an advanced level, and she reported intermediate skills int ICT administration tasks, such as data backups and virus protection (automatically done whenever she used he computer), cloud storage (used throughout the day as her main electronic file store) and management of her software installations. She reported less skill with and use of other specific ICTs such as Skype, social media, USB devices, camera, and website management.

In her interview Lucy clarified she mainly utilised Word editing programs for her knowledge creation actions, and internet searches to identify the knowledge gaps, or improvement opportunities, and to support her new creation arguments. Her use of Word, email, and PowerPoint was associated with KM processes of creating slides for publishing and presenting to share knowledge. Lucy also mentioned that her application of KM ICTs were a means “to access and build on others’ work”, providing opportunity for her to add her own research insights to create and improve knowledge. My ethnographic observations supported these findings, and in these

ways, the ICT application of Lucy's KM technology dimension was shown to have a definite linkage with her KM create, improve, store, use and share process dimension activities.

7.5.1.2 Emma

Emma's ICT survey results as shown in Figure 7.6, were similar to Lucy's in that MS Word, Email Outlook and Internet Explorer were her main ICT applications used, with a similar skill level, and Emma reported over 10 hours per week use on each of those three applications. Emma also reported more than 10 hours per week of television use; however, as she often worked remotely, it could be that the TV was on in the background rather than being a primary focal point.

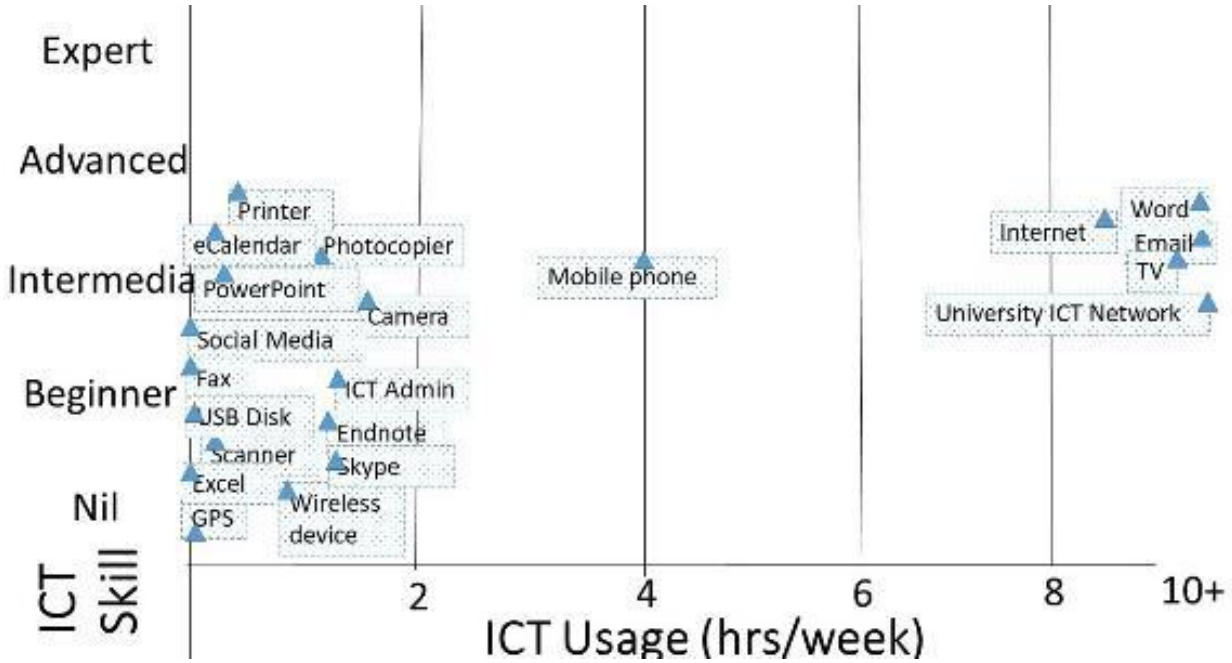

Figure 7.6 Emma's ICT Use and Skill

Emma discussed her ICT use in her interview, and like Lucy, she used a variety of other ICT applications to assist her to create, improve, store, use and share KM processes. Interestingly, Emma reported limited skills and use of wireless devices, as well as no experience in mobile

"texting" although she indicated plans to explore both ICT applications in the future. There is historical value in highlighting here that in the context of the 2010 era, mobile phones were mostly button based and quite clumsy and slow to type on. Users invented shortcuts to save their fingers pushing buttons, and to fit more words into one 60-character text message. This resulted in abbreviated "text-speak" sentences such as "btw" (by the way), or "lol" (laughing out loud at the content of the conversation). This text-speak was observed in the research team; however, it was used infrequently as phones became better and the predictive text, spell-checking functions and the talk to text functions the reduced need for typing. So, even within the brief temporal snapshot of this study data collection, the evolution of ICTs were having a real-time influence on team communication of KM capacity. For Emma, texting was obviously an ICT she had not felt much need to adopt at the time of the study. This phone ICT usage may also have been influenced by her being an extrovert, and therefore she preferred voice communication.

7.5.1.3 Paul

Paul often joked that he was a technology laggard, lacking in ICT skills, even though I observed that his ICT skills were actually quite advanced. His survey results support my observations, revealing that he had similar ICT skill and use to the other team members, as shown in Figure 7.7.

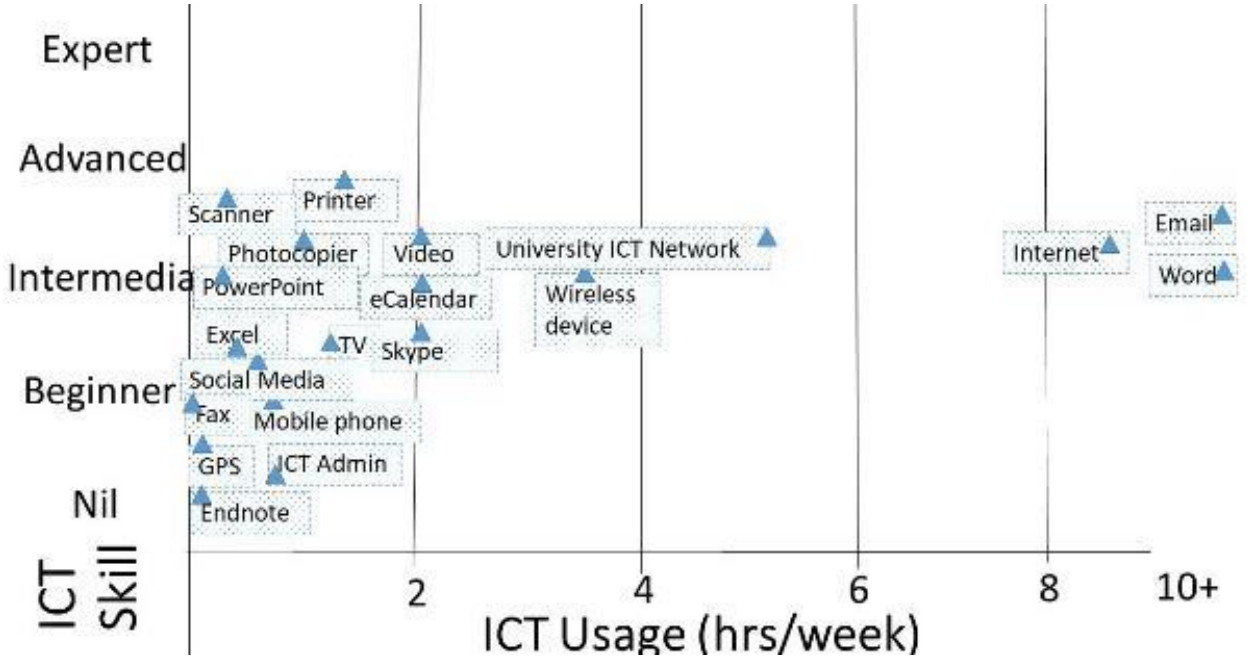

Figure 7.7 Paul's ICT Use and Skill

Paul reported well over 10 hours per week use of MS Word and email in order enable his KM processes to churn out his significant number of publications and presentations. At the other end of the spectrum, though, Paul had limited skills and use of ICT applications, such as bibliographic software (Endnote), as he preferred to do this manually. Paul reported only half an hour of mobile phone use; however, his use of Skype and the telephone landline (which was not measured by the survey) were observed to be higher. Paul liked to use paper, and his use and skill with the printer, photocopier and scanner support this observation.

7.5.1.4 Wal

Like the other participants, Wal reported Word, email and the internet as being his main ICTs used, consuming about five hours at an advanced level of skill, as shown in Figure 7.8.

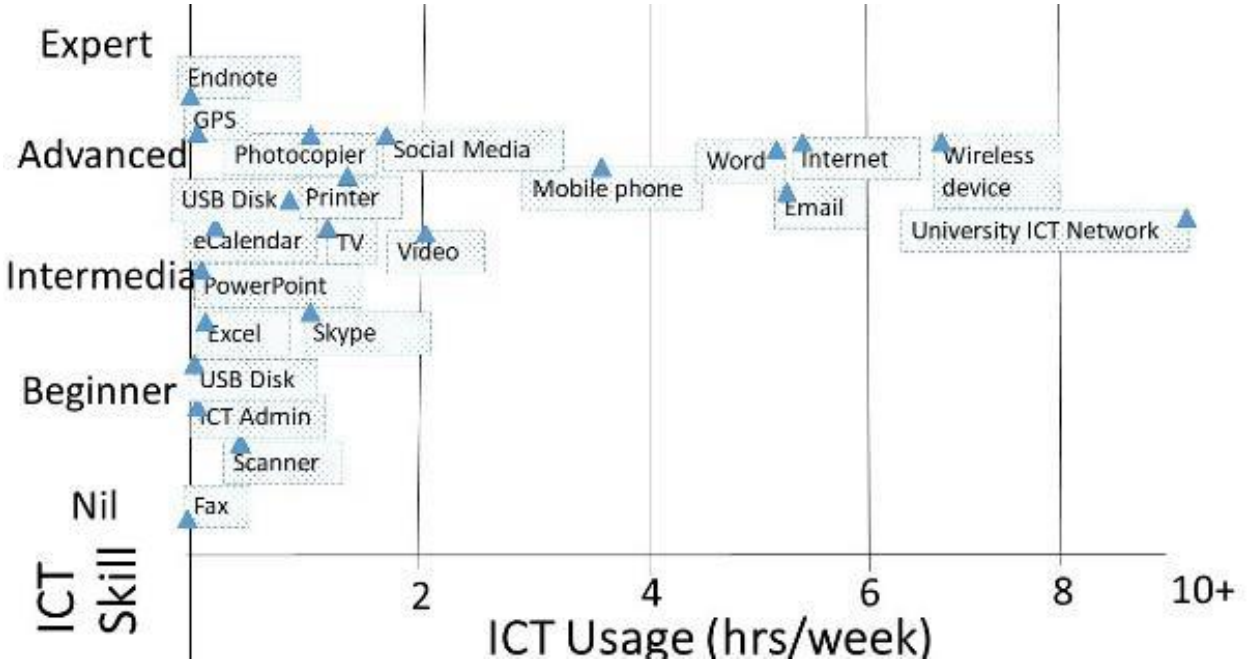

Figure 7.8 Wal's ICT Use and Skill

Wal was a lead user, and early adopter (Rogers, 1962) of the iPad, which he had wirelessly connected to the university ICT system. At the time of this research, this iPad was still relatively novel, and the opportunity for instant internet access (wireless, 6x9 inch touch screen) was a step-change from fixed, mouse-driven technology all participants had ready access to back in their offices.

Wal was also an early adopter in obtaining application software on his iPad, such as Drop box (a file sharing program) and When-is-good (a meeting time arranger that enabled different time zones to be correlated to arrange international meetings). Other members of the team noticed the KM capacity advantages of the iPad and subsequently obtained iPads themselves. However, others would often have the iPad with them, but leave it turned off on the desk, accessing it only

on rare occasion to check an email or do a search. For example, Paul would ignore his iPad and continue with his proven method of a folded A4 page to take action notes in.

None seemed to adopt the iPad technology as substantially as Wal. Whilst he would enter everything into his iPad he did concede "I would be lost without technology, everything is in this. However, I suppose I could get the information back off the university server if something went wrong". In the interview, Wal announced that he was striving toward having a paperless office and lamented that his students still burdened him with paper to read and process.

7.5.1.5 Owen

ICT survey results from Owen were limited and so a graph was not produced; however, he reported using his mobile phone for both calls and text for about two hours per week, and he spent about an hour per week on ICT admin, doing data backup and protection activities. Owen was observed to have similar engagement to the other participants for his Word, email and the internet use and skill, which was evident in the publications and presentations he produced.

In his interview, Owen considered himself neither an early adopter or a laggard user of new technology, and he was in the middle of the technology uptake along with the majority of users. He also noted that his skill level was also in the middle tier, and he was neither expert nor unskilled. Owen lamented that he only used a fraction of his iPad capability, mainly to send emails, explaining "I know that the iPad has greater capabilities than that, but I don't choose to take time away from something else to devote to learning about the greater capabilities, because other academic work takes precedence". In this way, Owen pragmatically adopted new technologies only after the early adopters had proven the technology useful enough to convince Owen that it was worth investing time to learn it.

7.5.1.6 Ruby

ICT survey results from Ruby were not forthcoming and so a graph was not produced. However, Ruby was observed having similar engagement to the other participants for her Word, email and the internet use and skill, which was evident in the publications and presentations she produced.

7.5.1.7 Marge

ICT survey results from Marge were also not forthcoming and a graph was therefore not produced. However, Marge was observed to have significant engagement with both SharePoint and the websites, which were her specialist ICT skills.

7.5.1.8 Kandy

ICT survey results from Kandy were similarly not forthcoming. Kandy was also observed having similar engagement to the other participants for her Word, email and the internet use and skill, evident in the publications and presentations.

7.5.1.9 Dave

Like the other participants, Dave reported Word Excel and email as his main ICTs used, consuming over 10 hours per week at an advanced level of skills, as shown in Figure 7.9.

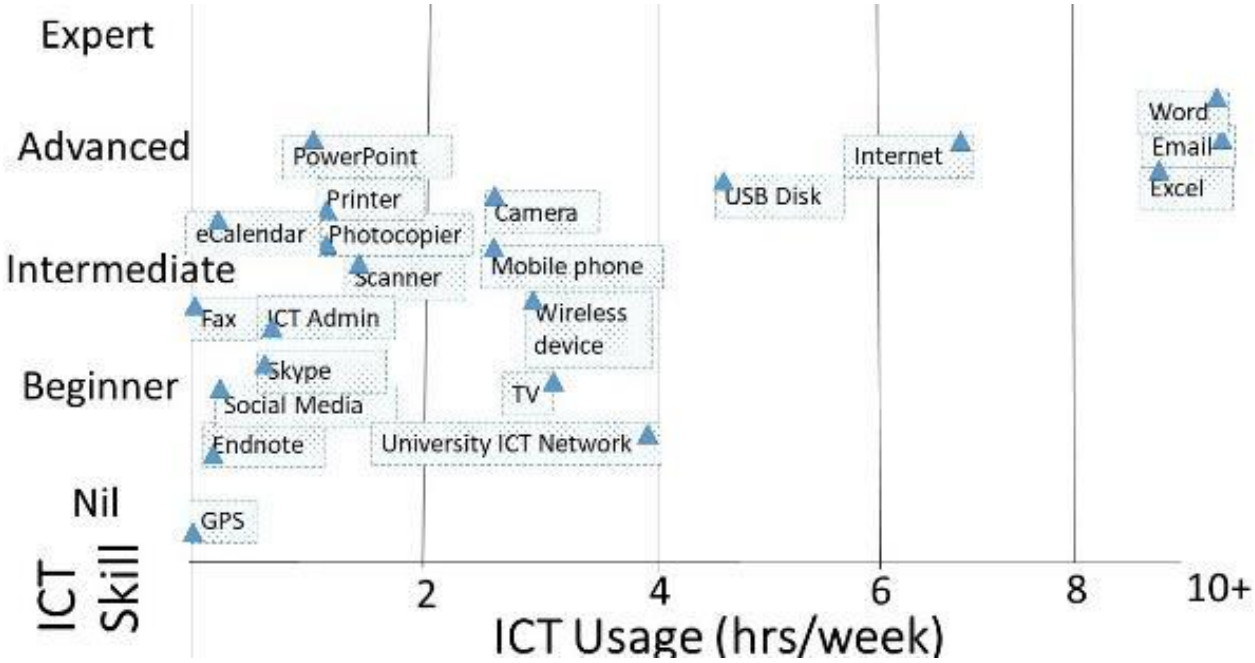

Figure 7.9 Dave's ICT Use and Skill

Dave reported being fond of the Excel application as it enabled different "sheets" of data to be entered, enabling the tool to grow in width as well as length, and so a large amount of information could be stored in a very accessible way. Moreover, Dave regularly used external hard-drives to move data around his various work locations.

7.5.1.9.1 Mobile Phone Technology

Dave's personal phone technology is shown below as an example of how participants ICT upgrades iteratively improved their KM capacity. Figure 7.10 shows on the left-hand side his old LG branded "flip-phone", which served him well during the data collection period. This push button style phone required a complex button pushing method in order to type short message service (SMS) texts, which was mentioned in the analysis of Emma's phone data above. During the data collection period Dave upgraded to the (then) cutting edge Nokia-branded touch screen

"smart" phone (on the right hand side), which not only had a full keypad to text on, but also contained some voice recognition software that reduced the need to type in letters.

Figure 7.10 Cell Phone Technology

At the time of this thesis publication in 2018, the LG flip phone has become obsolete as it worked on a 2G network, which is no longer supported in Australia. However, the Nokia is still performing adequately as a KM capacity device, with 4G network coverage, wireless Bluetooth

headset, and providing a hotspot for PCs to wirelessly access the internet. Dave upgraded his phone again after the data collection period, seeking further KM technology capacity improvement offered by the newer phone, and also gaining the success and status symbol that a more modern phone provides, and consequently the old Nokia is now used only as a emergency call device.

This example highlights how the technology dimension develops, and the participants' KM capacity is influenced accordingly, revealing the intermeshed relationship between the process, human, technology, and context dimensions.

7.5.2 Further Discussion of How ICTs Constructed KM Capacity

ICTs within the technology dimension helped to construct the team KM capacity as introduced in the survey analysis above. Some of these ICTs are discussed further below, including how the office facilities, telephone and SharePoint technologies influenced KM capacity.

The technology dimension was vital to enabling the CISUS processes, with the personal computer, and often a number of personal computers, frequently utilised (at different times and locations) by participants to construct their KM capacity. The word processor was a significant technology tool used by all participants to construct KM capacity, with Word, Excel, and email being vital tools in this process. Search engine technology, such as Google, was reported to be widely used by participants, to broadly investigate and baseline existing KM related to their KM capacity, although being academics, their main citations related to a topic were sourced by searching the electronic journals. Furthermore, the new cloud storage system, whereby data is stored somewhere that is accessible through internet, was adopted by some participants, particularly Lucy and Mark. The cloud storage facilitated storing a master version of a document

that multiple authors could then access, which constructed participants capacity to create knowledge in collaboration with others.

Web 2.0 technologies were trialled by the research team in 2011. Some participants had adopted various Web 2.0 social media technologies, such as Twitter, to increase their capacity to maintain an information feed on breaking developments that could inform their research. SharePoint was also trialled, if with limited success, as for some reason participants had difficulty logging in, and the administrating staff member who had championed SharePoint was promoted to another role before the sharing process had been fully established. The team's trial of collaborative KM sharing tools such as SharePoint revealed to the team (as noticed by all members) that it could add value, as discussion threads save having to reiterate, and all members could access a discussion rather than being left off email replies and out of the loop. However, during the data collection period of this research, the use of collaborative knowledge sharing tools was not maintained consistently by the research team (Matthews, 2012).

The sharing element of the CISUS KM architecture has been greatly improved by Web 2.0 technologies, as it is the sharing of knowledge, particularly user-uploaded content, which is fundamental to Web 2.0 philosophy. The team's uptake of the SharePoint technology was slow because the existing ICTs sufficed for what the team wanted to achieve, and without pressure or incentive to change, the team stayed with the status quo. Whilst it would have taken investment to nurture all participants through their technology adoption phases, and embrace technologies such as SharePoint, I believe that the resulting capability offered by the Web 2.0 technologies could have facilitate the construction of a higher level of KM capacity within the research team, had it been adopted.

7.5.2.1 Office Technology Adoption

All participants engaged with the KM technology dimensions in some way, shape or form in the process of constructing their KM capacity. Firstly, office facility technologies, such as fridges, lights, microwaves and vehicles, enable academics to pursue KM work activities rather than subsistence tasks. Secondly, since the popularisation of the personal computer in the 1970s, the digital technology revolution has significantly accelerated and magnified the global impact of regional knowledge workers. The computer was considered a vital aspect by each member of the team and based on the ICT survey data analysed in relation to RQ2, each team member spent between 10-20 hours per week engaging with such technologies. Collectively then, the team members' weekly KM technology use was substantial, as the ICTs empowered the participants with KM capacity benefits.

Over the last few decades, there have been significant inflection points in growth and prosperity enabled by technology, as the world has grown from its previous industrial economy to a global, interconnected internet economy. We are now moving toward a networked economy through digitisation of multilayered, highly interactive, real-time connections among people, devices, and businesses and it is predicted that over the next 10 to 12 years (to 2030), the networked economy has the potential to double the size of the gross world product, and could represent an economic value of at least $90 trillion (Massachusetts Institute of Technology [MIT], 2014). So, this metric reveals the potentially significant influence the technology dimension of KM can have on economic capital.

It is important to reiterate that this case study was conducted at a regional Australian university, and as such KM capacity of digital ICT capacity has become increasingly vital to overcome the relative isolation in terms of global position. Some examples of this from the team

data have been provided by the RQ2 analysis of the technology survey, showing the significant hours participants were using ICTs every week for their team and personal developments. With these ICTs, the tyranny of distance was reduced according to DISC theory (Matthews & Danaher, 2011), and participants had almost equal opportunities to their metropolitan-based peers to create, improve, store, use and share knowledge with their international, network level, peers. For example, participants could video conference in from another regional location but could just as easily been on the other side of world. The technology to achieve this process is the same, and once that point-to-point technology exists, distance becomes irrelevant. Similarly, email (or iterations thereof, such as Drop box and SharePoint or websites) enable documents to be sent electronically, almost instantly as they have no need for physical transport. I recognise that this team was not an isolated case of this technology use/skill and was perhaps somewhat typical of most contemporary knowledge working teams of the time.

7.5.2.2 Telephone and Email Technology

In the ICT survey, all team members reported use of and skills with telephone and email ICTs. I have previously discussed how these two ICTs were used in combination to assist with the construction of team KM capacity regarding time and effort saving from not having to physically move (Matthews, 2012, pp. 211-212). Thus, the technology dimension facilitated the team's KM capacity by not only enabling both synchronous and asynchronous communication, but also by enabling the knowledge to be codified, and explicitly documented for further discussion and development. Also, the use of the electronic calendar in Outlook was noted as a third element of this combined ICT, because if a face-face meeting were required it could be instantly arranged and coordinated by the shared electronic calendar.

The technology dimension thus facilitated participants' interactions across space (distance) to assist them to construct their KM capacity and produce their knowledge outcomes. In this way, the technology dimension application of audio and video conferencing technology facilitated KM capacity, as it enabled a remotely located participant to virtually attend the meetings, enabling participants to work remotely, yet still be in contact with the team. In my ethnographic observations I noted that all participants seemed quite comfortable interacting through the telephone or video conferencing technology, and thus this ICT enabled the team to function effectively even though they were often physically dispersed. In this way, I think tele/video conferencing technology offered the team a clear KM capacity improvement, in support of DISC theory (Matthews & Danaher, 2011), whereas the SharePoint tool value was less clear to them and so was not embraced.

7.5.2.3 SharePoint Technology

Another technology that was being introduced at the case study university during the time of this study was Microsoft SharePoint. SharePoint can establish information environments that make it easy to collaborate on documents or share a calendar, rather than sending files back and forth via e-mail (Williams, 2007). The KM technology of SharePoint empowers and enables staff in the communication and collaboration of knowledge sharing (Matthews & Cronan, 2010). The team engaged Marge's expertise in order to trial the use of SharePoint, as discussed previously. In her interview Marge expressed disappointment that the team did not embrace her SharePoint developments: "I just don't know why they don't want to use it".

7.5.2.4 Website

The team, facilitated by Marge, also developed a website to enhance the external image and communication of the team. The website had limited initial success, as the team context was very

focused on producing knowledge outcomes to meet the university KPIs, which in this case were more traditional KM products such as books, journal publications and conference presentations. These more traditional KM outcomes stole the focus from the new web 2.0 media (SharePoint, website), and the website struggled to get team attention, although it did go "live" in late 2011. It is difficult to exactly measure the impact of the website however, it did not deliver much capacity toward the team KPIs. However, the website did contribute to the different forms of capital present in the team, as will be discussed in Chapter 8.

7.5.2.5 Cloud and Social computing

The use of more cloud and social ICT tools such as Drop box, Google Docs, Facebook and Research Gate gained interest from the team. Lucy, Owen, and Wal reported using Drop-box to collaborate on documents and stated in their interviews that they were not overly concerned by any security aspects. However, the literature recognises the security and privacy concerns with cloud computing, and suggest more strategies need to be resolved to increase the availability, confidentiality, data integrity, control and audit of the technology for the cloud to truly prosper (Zhou, Zhang, Xie, Qian, & Zhou, 2010). It is also noted that academics have an evolving symbiotic relationship with ICT, and whilst this can be an enabler, there is also increasing discourse on ICT being a disabler due to distraction (Gleik, 2011).

7.5.2.6 ICT Adoption for KM Capacity

Figure 7.11 presents a summary of the various ICT tools and applications utilised by this team in the construction of KM capacity, as identified from the survey, interviews and observations. Previous iterations of this analysis have been presented at conferences in Melbourne (Matthews et al., 2011) and in Toowoomba (Matthews, 2011).

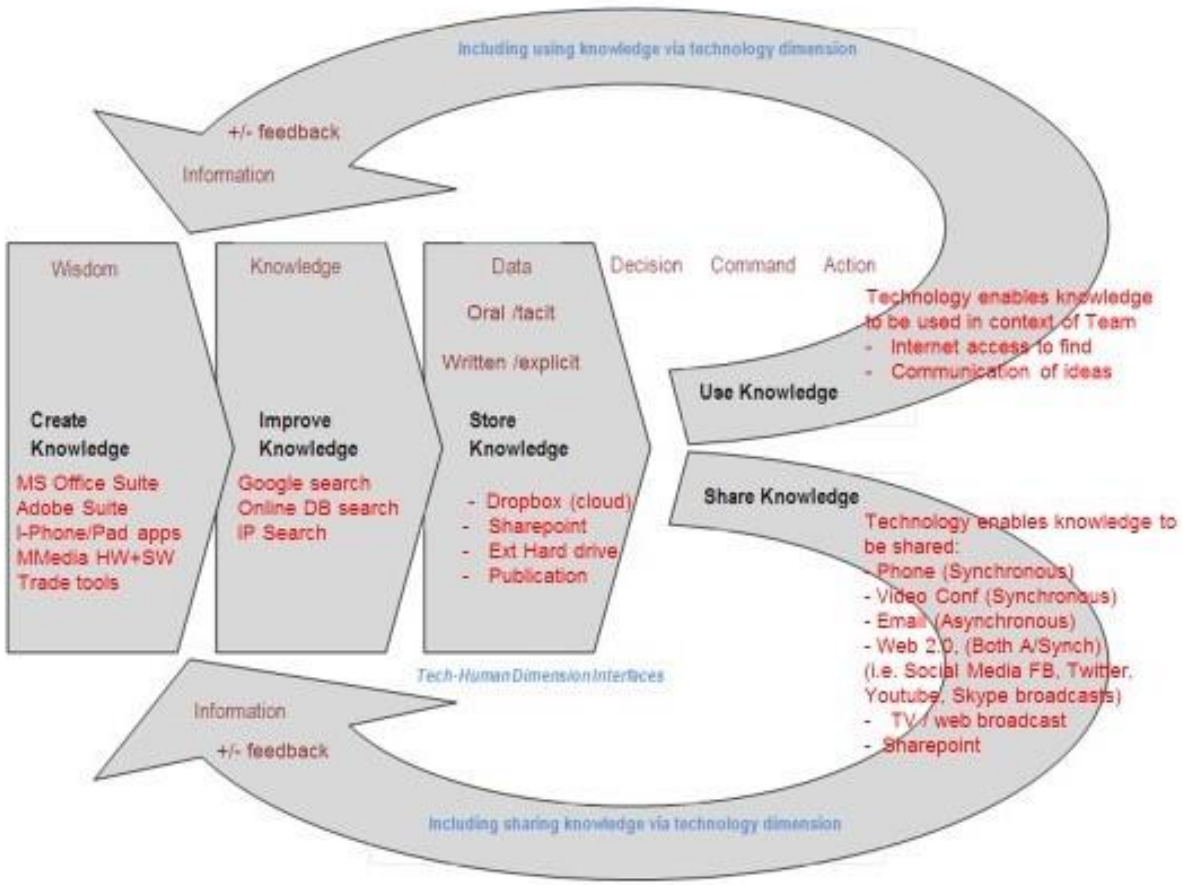

Figure 7.11 KM Technologies Used in Constructing the KM Capacity Process Dimension

Each individual within the team used the technology slightly differently, revealing a complex interrelationship between the process, human and the technology dimension. Whilst some individuals may really like a particular ICT, others may not like it at all. For example, Dave was very cautious with his technology use, particularly with web 2.0 technologies due to negative aspects such as the effects of hacking, inappropriate media postings by individuals, the risks associated with influential content within (Etter, 2017), the powerful agencies involved (Goodman & Powles, 2016), and Dave's suspicions were vindicated by the highly unethical Facebook data mining scandal that only recently became public (Warren, 2018). Personal preferences thus

pervade the technology dimension, and which resulted in a broad scope of ICTs being explored by team members, at various use and skill levels.

This study's observations highlight the vital relationship between ICT and KM, in that as ICT evolves so the KM practices and operations also evolve accordingly, as specifically evidenced in this study by the adoption of touch screen ICTs (such as the iPad and smart phones), and applications such as Skype and DropBox. As Drucker (2001) emphasised, the productivity of knowledge workers is the key. Thus, the evolution of ICTs in the technology dimension appears an enabler to academic knowledge worker productivity. Therefore, the team's technology dimension skill and use interactions enabled team KM capacity for productivity.

7.5.2.7 KM Reach, Cyber Centrality and Reliance

Also, it was noted that engagement with technology dimension can increase knowledge reach, in that the technology can, either synchronously or asynchronously, mediate national and international knowledge sharing (Matthews, Danaher, & Baguley, 2014). This knowledge reach aspect of KM capacity was enabled by the technology dimension of ICTs – not just the team website and the publication access over the internet, but also in terms of the participant ICT use across the CISUS processes.

However, the ICT tools were increasingly being relied upon in the team activities. I contend that the KM technology dimension were increasingly becoming central to support team KM capacity, and team functions were dependent on the technology systems working (Otterson, 2016). I have previously referred to that technology impact as cyber centrality (Matthews, 2012b). As the shift to cyber centrality continues, and ICTs increasingly become relied on as the primary backbone of societal KM capacity, the previous analogue KM processes are neglected to decay, and a situation arises that I refer to as "cyber reliance". That is, I argue that society, including the

research team in context, were entering a new "cyber reliance" era, whereby without ICT tools, KM capacity becomes significantly disrupted.

Barely 30 years ago, society functioned with minimal ICT, yet as our society's reliance on ICT increases, any outage slows or stops the KM processes which impacts the KM capacity of society. Some examples of this have occurred recently in Australia, with the Telstra outages in 2016 whereby e-commerce, communications and transport were disrupted (Dobbin & Battersby, 2016) and a national technology outage temporarily halted all Woolworths grocery checkout registers in April, 2018 (Rao, Eley, & Delibasic, 2018). Increased dependence on digital access to information also raises concerns related to privacy, ownership and affordability (Arup University, 2015). Any individual, team, organisation or network adhering to cyber centrality and cyber reliance principles trades off the risk between productivity advantage when the ICTs work versus the disadvantage when disrupted.

Despite being part of society following the cyber centrality trend, and becoming increasingly cyber reliant, the team did not appear to have technology contingency plans (Austin, 2016) that would have sustained them in event of an organisational or network level technology disruption. In this study, the participants were not digital natives by demographics, and they were observed using a pen and paper for note taking, having reference books on their office shelves, and filing cabinets in their offices. My study evidence reveals that whilst all team members did conduct ICT data backups, they all recognised that they could be more cyber-secure, with more regular data backups and greater cyber protections. During the course of my study, participants did overcome some minor technology mishaps (such as misplacing data, or a backup failing) without major setback. However cyber-reliance gradually increased over the data collection period. For example, some participants, such as Wal, were moving away from writing phone numbers and calendar

entries down on paper, preferring to store such information in electronic devices. Therefore, I suggest that because of this cyber centrality and reliance, the impact of major technology disruption would have been catastrophic on the team KM capacity. As it was though, in this study the technology dimension worked well for all participants and enabled the knowledge reach of all participants.

7.5.2.8 How ICTs Constructed Team KM Capacity

Overall, participants ICT skill and use, like participants MBTI preferences, was also diversified at a deeper level, however these differences were observed to collectively strengthen the overall team KM capacity. For example, participants were all quite willing to help one another with a technology they had skills with. For example, Wal was quite skilled with using wireless devices, and associated tools, such as the GPS navigator, yet less skilled with the scanner. So, Paul with his scanner skills could help Wal, and likewise Wal could help Paul fix wireless ICT issues. In this way, the team had various "ICT dichotomies" that, like the MBTI dichotomies, enabled the overall team to maximise any team members' ICT strengths by collaborating and helping each other to overcome any individual's ICT weaknesses.

KM technologies create a generational divide between those born before the Internet Age (1990s) and those who grew up being digital (Castells, 2010) and so are very comfortable with multimodal communication and digital information processing. The recent shift toward digital, KM technologies and practices has introduced the term "digital native" (Prenksy, 2001) to describe those fluent in contemporary cultural capacities for knowledge sharing via technology networks. In this team, there were no digital natives, (as is evident from the demographic data) however as all had post-graduate qualifications, all members had been educated to be quite competent and

comfortable with KM technology use and skills. Consequently, each team member had developed significant ICT skills with a number of digital KM technologies over their careers.

7.5.3 Conclusions about the Technology Dimension

The intention of this section of RQ2 was to explore how the technology dimension constructs KM capacity. The evidence shows the evolving nature of KM technology, at a time when revolutions in the technology dimension were occurring, especially towards touch screen and wireless knowledge management applications. This is an example of the continual change within the technology dimension to which knowledge workers must adapt. ICTs drive demand to codify knowledge, and once codified the information can be electronically stored, and then shared for further socialisation, personalisation and improvement. For example, in the context of an academic research team, the outcome of their KM capacity constructions produces further change by way of adding to the body of work and literature that future workers would engage with, which is the nature of academic work.

Nevertheless, despite this rapid evolution of ICTs, the nature of the human dimension is relatively slow to evolve, and so whilst the interfaces between humans and ICT may shift, understanding the human dimension to the KM processes will remain essential. The above sections have discussed specific ICT experiences of the study participants and reveals how the technology dimension is an important aspect in constructing KM capacity. Despite the diversity of ICTs that were being utilised by the team, the ICTs most significantly utilised by all participants to construct their research team KM capacity were reported to be Word, email and Internet Explorer.

This subsection has revealed nuanced evidence to inform how the technology dimension (in particular ICTs) assisted the team in constructing KM capacity. In Chapter 2, I highlighted how

ICTs are rapidly evolving, and new tools are regularly being introduced. These emerging technologies are an enigma in contemporary universities, with some cautiously skeptical of fads (such as Dave), and others committed to exploring the potential of such technologies (such as Wal and Lucy). Effectively all participants were exploring specific technologies in complex webs of interaction, both visible and invisible (Matthews & Danaher, 2011). In conclusion, whilst there was a multitude of ICTs being used by the participating team members, the ICT skills and usage were tailored to suit the participant's KM capacity needs and preferences, and whilst KM capacity can be constructed without any ICT, the ICTs significantly *enabled* participants to construct greater KM capacity by enhancing the process and human dimensional aspects, thus highlighting the need for wholistic study and comprehension of KM capacity.

7.6 The Context Dimension of KM Capacity Construction

This section considers *how* the context dimension influenced construction of KM capacity within the team, analysing the data with respect to the stage of the team's development is and the team culture. The KM capacity construction concept, as was developed in Figure 6.43, is applied to consider the contextual individual-team-organisational-network interactions of the team's KM activities. Also, this context dimension analysis enables readers to obtain a perspective on the human, technology and process dimensions that were analysed above.

The context dimension of this study, being a single case study site, was a consistent variable for all members of the team, and so any variation in context (the university) affected all participants construction of KM capacity. As the context changed, with the organisation adjusting to fit the dynamic marketplace, these changes were imposed on all team participants. Therefore, whilst this single site study did not enable comparisons between contexts, the RQ2 data analysis has instead

explored each participant's KM capacity construction variations within the team's common context.

7.6.1 The Team Maturity

This subsection of the data explores the development state (Tuckman, 1965) of the case study team (not the maturity of the individuals). Secondary data were utilised to determine the maturity of the team, including team formation documents and team publications. Ethnographic observation data were triangulated with these secondary data to support the KM context dimension findings.

The team was founded in July 2009, with the original seven members being Lucy, Emma, Paul, Wal, Owen, Ruby, and Kandy. Unfortunately, with my study data collection only formally commencing in December 2010, primary data were not gathered on the teams forming-norming stages. However, during my ethnographic observations, I was informed by several participants that prior to formal team formation, many of the team members were already well acquainted, and some had even previously published together – but not as a whole team. Certainly, there is secondary evidence in the form of a number of academic publications produced by various combinations of team members prior to July 2009[8]. Some of these prior publications, such as the first book, were constructed collaboratively within the team, with each team member contributing to a couple of chapters each. This rapid KM productivity suggests that the team's development was fast-tracked by their prior familiarity and resulting cohesion (Hall, 2015), such that the diverse team navigated the complexity to move through their forming, norming and storming stages of

[8] This prior publication has not been formally cited within this thesis in order to protect the anonymity of those who became participants in my study. However, citations can be provided for examination if required.

development (Seck & Helton, 2014; Tuckman & Jensen, 1977) to reach their perform stage of productivity (Natvig & Stark, 2016).

By the time my study data collection commenced, the context of the team would have been in the performing stage of its development, with established relationships and goals. Yet despite the team maturity context being in the performing stage, the team KM operations were still organically evolving as it progressed. For example, in late 2010, the team changed its official name to reflect three key goals that would align with the higher Universities KPIs – to write another book, to apply for research contracts (grant funding), and to present at conferences.

As a member of the team, I was actively involved in all three of the team KPI activities, and the team met fortnightly to discuss and progress these activities. This case study documented the KM capacity that the team deployed in their progression of these goals, and as they achieved these goals, the team matured towards the performing stage of capability. By the end of my data collection period on 1 December 2012, the team was nearing the end of its performing cycle, having published three books, and multiple journal and conference publications. Toward the end of my study data collection, the team's high performance was recognised by the Faculty Dean and the team was subsequently acknowledged in a University publication on research achievements (Case Study University, 2013).

It is thus important to recognise that the context of my study is situated in the "performing" stage of team maturity and he profile data reflects how the KM capacity of this mature, performing team produced high quality publication outputs.

7.6.2 The Team Culture

The culture of this team was analysed by considering the environmental and organisational structure of the university context and where the team fitted into that context. Secondary data, such as team formation documents and team publications, were utilised to infer the culture of the team. This was triangulated with my ethnographic observations to determine the culture of the team, to support and validate the findings. It was noted that all the team members were operating in the same contemporary university culture context, so that there was a consistent environment around the team, even if this environment was in itself evolving over time.

The team being studied was founded within the then Faculty of Education. This time/place of this study is relevant as the team context is influenced by the contemporary Australian regional university environment, and by the technology dimension aspects. During this study, the higher education context was continuing its transition from the free, public education of the 1980s to a deregulated, competitive, privately funded educational business model (Kniest, 2015; Meek & Wood, 1997; Mollis & Marginson, 2002). Whilst the higher-level context of the university adapted to these changes, ideas for this study around the influence on faculty research was distilled and inferred from the team and university documentation, the university institutional archives, and direct ethnographic observations of the team operations.

At the time of commencing this study data collection, the case study site university was an Australian regional and outer metropolitan university, with multiple campuses, and was recognised as a leader in open and flexible education (Case Study University, 2009, p. 7). Another university plan highlighted the essential role of staff in organisational success, and initiated a refinement of the KM systems (Case Study University, 2009, pp. 7-9). Furthermore, in 2007, improvements to the university's Quality Management Framework (QMF) led to the recognition of a major whole-

of-university change initiative (Case Study University, 2009, p. 13). The "*Realising Our Potential"* (ROP) initiative was instigated to respond to rapid changes in the operating environment (Case Study University, 2009, p. 9). The university *Strategic Plan 2009-2013 "Embracing the digital education revolution"* (SM01.07) expressed two main themes: sustainability; and open and flexible higher education (Case Study University, 2009, p. 9). In 2009 the case study university began implementing another phase of ROP, with the introduction of major technology systems to support newly devised improvements in services and outcomes (Case Study University, 2009, p. 13). With over 50% (in 2007) of academic staff holding a doctoral qualification (Case Study University, 2009, p. 12), and the engagement with continual improvement through audits for learning, teaching, organisational and infrastructure developments, the operation of a quality (KM) cycle was evidenced in the case study university's operations.

With that university research strategy in mind, the faculty administration had directed that particular Key Performance Indicators (KPIs) be met by the team in order for the team to be considered competitive for further university support. The KPIs included targets for research outcomes such as peer reviewed book, journal or conference publications, and external grant or consultancy funds. The participants often collaborated to construct KM outputs that achieved those KPI goals required by the university. For example, the collaborative production of the team publications led to the team being recognised within the faculty for their KPI performance. From a KM perspective, the directed KPIs focused the team on achieving tangible outcomes from their research activities. The team brought together expertise and experience from a range of areas and sectors within the field of education (Research team, 2011). By collaborating, the team could cover interdisciplinary research areas, and be competitive in obtaining grant funding and publication opportunities.

Team members maintained a very collaborative culture among themselves, with all members being very professional, collegiate and supportive of one another. It has been noted in prior research that during the productive, performing stage team members complement each other's skills and efforts to achieve common goals, trusting and respecting each other's opinions, even when views differ, and they acknowledge each other's contribution and inputs (Kumar et al., 2014). This complementary trust and respect was continually evident and I highlight that there was no dysfunctional conflict observed within the team. However, I acknowledge there was definitely existence of healthy, functional debate. For example, team members would often discuss their various diverse views in detail, sometimes even playing devil's advocate to a proposal. This collaborative, collegiate debate function generated a more rounded resolution and conclusion. In this way, research and research team building are not only about the research tasks but also about the collegiality and teamwork essential to carry out the tasks (Strnadová, Cumming, Knox, & Parmenter, 2014, p. 21).

However, I did notice that all participants seemed aware of the competitive environment outside the team, and that the team's very survival depended on it meeting the faculty and organisational directed KPIs. Indeed, in her interview, Emma said "I sense that in an academic career, the culture of academia is highly competitive and highly hierarchical". This situation caused a "creative pressure" within the team culture, similar to what I have experienced in more entrepreneurial organisations (Drucker, 1998), whereby all team members were highly motivated to create, improve, store, use and share their knowledge to enable the team KM capacity outputs. Whilst it is difficult to quantify a team culture, this team culture was considered to be leaning toward being collaborative and non-hierarchical. Whilst one team member is technically "leading" by taking KM ownership of a task, such leadership in this team was more collaborative than

directing or authoritarian. Therefore, overall, the evidence supports the team culture being mostly characterised by a collaborative, non-hierarchal nature.

I consider that the team's collaborative, non-hierarchal culture, combined with the perceived external competitiveness, manifested within the team, collectively and individually, in the form of creative pressure that produced tangible KM outcomes to meet the university and faculty required KPIs. For example, the team actively explored and developed publication, consultancy and grant funding opportunities with a vigor that I have only ever experienced in entrepreneurial "start-up" ventures, rather than in the increasingly corporatised, bureaucratic culture that has influenced contemporary Australian universities. Accordingly, I can appreciate why the team members felt so enthusiastic to belong to, and interact within, such a team culture.

Thus, the culture of the team can be summarised as professional, collaborative, collaborative, non-hierarchal and entrepreneurial, and all of these cultures combined to construct the team KM capacity. This culture influenced how the team was attractive for participants to construct KM capacity within, and also attracted other academics to seek to join the team which will be considered in RQ3.

7.6.3 The KM Capacity Construction Concept

The KM capacity construction concept developed in Figure 6.43 reflects the broader KM context beyond the boundary of the organisation, incorporating the network level. The team context was situated within the organisational level of the university, or the higher education research and development space. The Mandala analysis enabled visualisation of this context, with its engagement across the individual-team-organisation-network levels, and the triangulated

interview and ethnographic data revealed how team members each engaged with each other in collaborative ways to produce the team knowledge outputs, as was discussed above.

There are various definitions for teams, with subtle differentiations, and one definition that fits this particular team is offered by Kozlowski and Bell (2003, p. 334):

> a collective who exist to perform organisationally relevant tasks, share one or more common goals, interact socially, exhibit task interdependencies, maintain and manage boundaries, and are embedded in an organisational context that sets boundaries, constrains the team, and influences exchanges with other units in the broader entity.

This team existed, embedded within the case study university's organisational context, with the goal to perform research tasks that met the KPIs of the university organisation, influencing exchanges with the broader entity (and with the network level external to the university), with the added bonus of interacting socially. This context dimension influenced how the participants and team constructed their KM capacity by setting team goals and resourcing them accordingly, even if this also somewhat constrained the team to deliver on just those KPI goals and not explore other interests. So, each individuals KM capacity was tailored to achieve the KPI goals within this particular context dimension, rather than some other context dimension, which influenced how the participants managed their knowledge. For example, in this context, academic publication was highly desired, and so each individual performed KM to deliver publications. So, the contextual demands and expectations had a significant influence on KM, not just in terms of the how, but also the why. This further relates to the human dimension evidence analysis (Section 7.4) which revealed that the organisational context desired very ESTJ attributes, and this influenced the team context to deliver ESTJ style outputs.

The participants constantly maintained relationships with various faculty and university persons as required to transfer information up or down the chain of command. The KM capacity construction concept from Figure 6.43 provides a reasonable model to analyse these team knowledge flows and is applied again to analyse how the team constructed KM capacity in the context dimension, considering also the team's KPI reporting documents to reflect on the team aim of managing individual and team knowledge to move from existing knowledge baseline towards the construction of new learned (researched) knowledge. As an example of the knowledge flow upwards, the team applied through the faculty and up to the university management for research grants in competition with other academic research teams. Also, the team output achievements were fed upwards in a formal report to the faculty administration, to be considered by the university management for evaluation against the KPI requirements. An example of the knowledge flow downwards was that as a result of the team's productivity, the university provided formal recognition back by congratulating the team for their outstanding performance on the KPIs, and the team KPIs for the next year were subsequently advised. These are both examples of the feed-up and feed-down processes theoretically defined in the KM capacity construction concept at Figure 6.43, and together they present an applicable model of the cross-level relationships. Each individual within the team pursued their own unique relationships across the levels, with each engaging in the feed-up/down processes according to their KM capacity development needs and requirements.

Within the university's organisational level, during the data collection period an audit culture prevailed, this being ERA (Excellence in Research for Australia) with audits held in 2010 and 2012. Incidentally, this ERA audit cycle continues, with subsequent audits of the case study university held in 2015 and 2018. This broader audit culture influenced the team context in terms

of the university organisation's evolving KPI interests in research and how this overall context dimension influenced the team KM capacity culture and maturity.

At the network level, in this case, it was realised that interaction occurred through the academic sharing of research insights with peers beyond the organisation, in the form of publications shared and conferences attended. These interactions suggest that there was additional focus on the network level of the KM capacity construction concept. That is, the team members engaged with feed-up and feed-down knowledge processes with peers beyond the organisational boundary, in their professional, international networks. This "network" level engagement was noted in a team publication which advertised the team's focus "to be on global, national, and regional/community futures" (Case Study Team, 2011). This secondary source provides further evidence that the team sought to engage with peers far beyond the organisational level. The team further acknowledged that capacity-building processes are multidisciplinary and may be realised at individual, team, organisation, industry, or community levels (Case Study Team, 2011).

The team achieved this network level engagement by collaboratively developing publications through the CISUS process dimension, leveraging their human dimensional knowledge specialisations, and being enabled by the technology dimensional tools. Thus the network level of the KM capacity construction concept in this case incorporated that industry and community levels, as well as regional, state, national, international and global levels.

7.6.4 Conclusions about the Context Dimension

In conclusion, this section has analysed various data sources to address the context dimension aspects of RQ2 and reflect on *how* the participants constructed their KM capacity within their particular team maturity, team culture and organisational level. My ethnographic

observations have been triangulated with the other data to conclude that the team was utilising their technology dimensional tools to engage beyond the organisation with the network level context. In Chapter 8, consideration is given to *why* this network level engagement was important to this particular team context, which is arguably where the participant's and team's greatest cultural and social capital could be earned. Also, the team was evidenced to be in the performing stage of its life cycle maturity yet had a somewhat entrepreneurial culture that enthused the participants to engage with this broader network level, in the interests of further constructing peer KM capacity related to their knowledge specialisation. However, without the enabling aspects provided by the technology dimension ICTs, the participants' network level engagement would have been reverted back to past ways, with significant reduction to their KM capacity.

7.7 How the Team Collaboratively Co-Constructed KM Capacity

Focus Group 3 enabled confirmation and validation of the compiled process, human, technology and context dimensional findings as discussed above, and the presentation stimulated further discussion on team interactions and how they constructed KM capacity. Focus Group 3 concluded that each participant's view was quite accurate in its own right, yet the KM capacity of the team was constructed from considering the combined perspectives of all. This provides a further example of how the team worked well together to construct KM capacity – it was the combination and synthesis of each participant's perspectives that provided such a deep, rich view on a subject matter.

I reflect on what Paul mentioned in his interview, namely that in the team collaborations, "We've all got the basic goodwill and trust and support and respect for one another and we understand that". Other participants such as Kandy, Emma, and Wal echoed this view, as is highlighted in their Mandala analysis in Section 6.6. The collaborative, inclusive culture of the

team and *how* it constructed capacity within its knowledge network was highlighted to me during Focus Group 3 where each participant's opinion was included, valued and respected (rather than excluded and ridiculed).

My ethnographic experience of being a member of this team affirms this collaborative, co-constructive culture of the team in that context, and during Focus Group 3, I further comprehended the empowerment such collaboration had. The team encouraged and supported each other to freely express their true MBTI perspective and so each team member was confident of extroverting and sharing their views on an issue – in this case on the team knowledge network. That is, by each participant sharing their highly educated and insightfully diverse views from their own MBTI perspective, the combined power of this team as a 'think-tank' became clearer to me. Through this collaborative, co-constructive process, when each participant shone their respective intellectual "lights" onto a problem, because each light came from a different angle, the functional effect enabled them to see new facets and perspectives, which co-constructed the team's KM capacity. This collaborative co-construction of KM capacity was considered a key aspect of the KM dimensional context influencing this team.

The RQ2 data analysis again highlights the diversity of those participant profile preferences (as identified in Chapter 6) and how this participant diversity enabled and enhanced their collaborative, co-constructive KM capacity against the backdrop of ongoing academic work intensification (Matthews & Danaher, 2013).

7.8 **Conclusions to RQ2**

This chapter has analysed case study data to address RQ2 and how participants constructed their KM capacity, using the KM conceptual framework from Figure 3.5 to structure the analysis, and drawing on the RQ1 profile results from Chapter 6. The findings reveal that the diversity

theme from the RQ1 findings was continued as all participants had slight differences in how they each constructed their KM capacity across all four dimensions.

Evidence was presented to support that this collective combination of individually diverse KM capacities co-operatively and collaboratively co-constructed an over-lapping and intermeshing of participant perspectives that reinforced the KM capacity of the whole team. That is, one participants strengths reinforced the other participants weaknesses, such that the KM capacity of the team became greater than the participants could have achieved had they worked individually. This enabled an overall effect of a productive team performance that was acknowledged at the broader organisation and network level.

The evidence analysed in this study has provided empirical granularity to support the four-dimensional framework of wholistic KM capacity, as shown in Figure 3.5 conceptual framework, and reveals how the process, human, technology, and context dimensions are interconnected components for the wholistic construction of KM capacity, in answer to RQ2. In the next chapter, all data sources are further analysed to explore *why* the participants constructed their KM capacity, to address RQ3.

8. RQ3 DATA ANALYSIS: THE KM CAPACITY-CAPITAL RELATIONSHIP

8.1 Introduction

Chapter 6 provided a KM capacity profile of *what* participants in the research team were for RQ1, and Chapter 7 described *how* participants constructed their KM capacity to address RQ2. This chapter analyses *why* participants constructed their KM capacity, responding to RQ3, which asked "*What was the relationship between the team's KM capacity and the team members' economic, cultural and social forms of capital?"*

The RQ3 data analysis draws on the Chapter 3 conceptual framework and contemplated the relationship between the four KM capacity dimensions and Bourdieu's (1986) forms of economic, cultural and social capital. The data sources analysed were mainly the ethnographic observations and interviews, supplemented and triangulated by all the other data sources analysed for RQ1 and RQ2, as was described in Figure 5.1.

Three themes revealing the KM capacity-capital relationship have been drawn from the data, these being the teams' KM capacity *objectives*, *outputs* and *outcomes* as is outlined in this chapter's advance organiser in the following section. The findings provide evidence to support the theoretical KM capacity-capital architecture to enhance understanding of *why* the participants constructed their KM capacity.

8.2 The Structure of this Chapter

The presentation of findings in this chapter in response to RQ3 is structured to highlight the link between participants' KM capacity and the corresponding forms of capital that they constructed as a result of this KM capacity. Table 8.1 shows examples sourced from the data, analysed around three themes: KM capacity *objectives* ("membership of the academy", Section 8.3), *outputs* ("academic research outputs", Section 8.4), and *outcomes* ("academic career trajectory", Section 8.5), thus providing evidence to demonstrate the KM capacity–capital relationship.

Table 8.1: Advance Organiser for the Chapter 8 Presentation of Findings about RQ3

	Evidence of KM Capacity Construction (across the four KM dimensions)				Resulting Forms of Capital Constructed (Bourdieu, 1986)		
Chapter Sections and Themes	Process Dimension	Human Dimension	Technology Dimension	Context Dimension	Economic Capital	Cultural Capital	Social Capital
Section 8.3 **KM Capacity Objectives:** **Membership of the Academy**	Team CISUS activities to deliver on KPI goals, Collaborative, co-constructed capacity	Team membership (inclusion), Network engagement	ICTs (website, SharePoint),	Team identity (brand), KPI goals	Grant funds from faculty	Team brand recognition, KPI goals achieved	Team membership, Group-focus, Team power
Section 8.4 **KM Capacity Outputs:** **Academic Research Outputs**	Participant CISUS activities to produce publications	Collaborative construction of publications, Ambiminded personality	ICT tools utilised to produce publications, Cyber centrality	Academic culture "Publish to prosper"	Salary, Royalties earned, Conference attendance	Book artefact, Journal rankings, Citations	Faculty and peer recognition, Conference presenter

Section 8.5 **KM Capacity Outcomes:** **Academic Career Trajectory**	Processing knowledge to gain doctoral qualifications	Knowledge specialisation, KM capacity intangibility	Office facilities, Global reach	Award pay rates, Promotion	Salary pay rises, Lifetime royalties	Job title, Office facilities, Pre-nominal Dr	Higher peer ranking in the academic network

The KM-capacity-capital model developed in Figure 3.5 is then revisited and revised in Section 8.6 in the light of the study's analysis and findings. Finally, Section 8.7 concludes this RQ3 data analysis chapter.

8.3 KM Capacity Objectives: Membership of the Academy

From the analysis of all data sources as highlighted in Figure 5.1, the first theme identified in this study was the KM capacity objectives influencing the team - in particular, their objective to improve their membership of the academy. This theme was evidenced in the team membership (Section 8.3.1), collaborative KM co-construction (Section 8.3.2), funding (Section 8.3.3) and team identity branding aspects (Section 8.3.4).

8.3.1 Team Membership

In the context of this research team membership, the minimisation of the Matthew effect (Merton, 1968; Trapido, 2015) helped to increase further the advantage of being a team member. The Matthew effect refers to the heightened visibility of contributions from an individual with already eminent social and cultural capital, and the accompanying reduced visibility of individuals with lesser capital (Merton, 1968). In this case, the team shared lead author status of publications, and so the influence of any one author was minimised. Whilst there was some difference in the social and cultural capital within the team, as some members were more senior than others, a

collaborative culture existed, and team members were treated reasonably equally, influencing KM capacity and capital and making it more attractive for other potential team members to apply to join the team. That is, in a team, the less qualified members (such as myself in this team context) derive additional social and cultural capital just by being a member of a high performing team.

With this entrepreneurial spirit, KM outputs and the minimisation of the Matthew effect (Merton, 1968; Trapido, 2015), and based on how the team was achieving KM capacity results, the team increasingly gained positive attention and social capital. The team attracted interest from other academics within the faculty who wanted to join the team. There was early evidence of comments from team members such as "Person X enquired about wanting to become a member of the team". Consequently, the team would reiterate its standing decision that more team discussion needed to occur prior to expanding its size. Upon my realising this team decision to maintain the status quo, I felt privileged that I had become part of this team whilst other, more qualified academics, were expressing interest in being recruited as members.

To substantiate that ethnographic perception further, I acknowledge that given that I was a member of the team, there is risk that some readers may perceive bias in my profiling and reporting of the team. However, as stated earlier, the team was recognised for performance by the university faculty, and there was ongoing enquiry from other faculty staff eager to participate in the team. Thus, the evidence provides unbiased support of the team's status, performance and maturity.

This team membership situation made me question *why* others would want to join the team - bearing in mind that this situation occurred early in the data collection, prior to my observation of significant team outputs. Also, as was discussed in Section 4.6, I was primarily in the team to study the team ethnographically for my PhD research, and I saw my involvement in the actual team outputs as being secondary. I began to ponder what the benefits of being a team member

were such that others would want to get "in" on the team membership. I highlight here that it was never explicitly stated to me exactly what the benefits of being a team member were. The benefits just seemed to be inferred or implicitly understood by the team members, and also by those non-members who wanted to be a part of the team.

Thus, this "why" question emerged from this study's ethnographic observations and was the reason behind this further exploration of the relationship of KM capacity with the various forms of capital. That is, the elusive "why" as to what was motivating the team members to invest effort to construct their KM capacity, and to produce outputs and outcomes, intrigued me. As was discussed in Chapter 3, the KM process-human-capital relationship was noted in the literature, in that contemporary KM to improve organisational learning capabilities and innovative potential is directly related to the intellectual and social capital of individuals (Castells, 2010). Also the link between KM and various forms of capital is recognised by international KM practitioners (Heisig et al., 2016).

Through further reading of the literature, I became aware of existing theoretical relationships between KM and forms of capital as was discussed in Chapter 3 - in particular, intellectual capital (Bueno, 2012). However, none of these explanations satisfied my ethnographic observations. It was only through merging of the VW-M model with Bourdieu's (1986) forms of capital, as was explained in the Figure 3.5 KM capacity-capital architecture, that I felt that I had a theoretical explanation as to "why" the KM workers sought to construct their KM capacity. Through my merging of KM capacity with Bourdieu's forms of economic, cultural and social capital I could comprehend theoretically *how and why* my team membership had effectively boosted my membership of the academy, and how and why the team was constructing their KM capacity – to derive economic, cultural and social capital benefits. It was upon this realisation that I began to

explore further, and to gather rigorous evidence about, the team relationship with capital, and on that RQ3 took on its final shape.

In their RQ2 interviews, several other participants had explicitly stated that the team was more than the sum of its parts and was constructing KM capacity that each participant working alone would have struggled to achieve. Also I found that the team culture made the experience of working within the team pleasurable, enjoyable and exciting to be a part of for the reasons mentioned in addressing RQ2. That is, the team seemed to have an entrepreneurial culture and intent (Liñán & Fayolle, 2015), to an extent I have only ever experienced in my work with startups. This team culture enthused participants, igniting their creative "sparks of inspiration" and motivated them to "burn and perspire" which was *how* they constructed such KM capacity outputs.

Understanding more on *how* the participants constructed KM capacity led to comprehension of *why*. The literature suggests that most knowledge-sharing barriers are human- orientated rather than technology- or process-oriented, and that it is difficult to push people to share their knowledge as they tend to believe that knowledge is an individual power and as no-one wants to give away power (Heisig et al., 2016). In terms of power, the team knowledge specialisation and KM capacity construction of publications placed the team in a more powerful position to develop further economic, cultural and social capital. This perception of the KM capacity-capital relationship as a "power" is shown in a cartoon (Adams, 2004) in Figure 8.1. This cartoon used humor to amplify *why* the construction of KM capacity is pursued – in this case to empower the team members with greater economic, cultural and social capital.

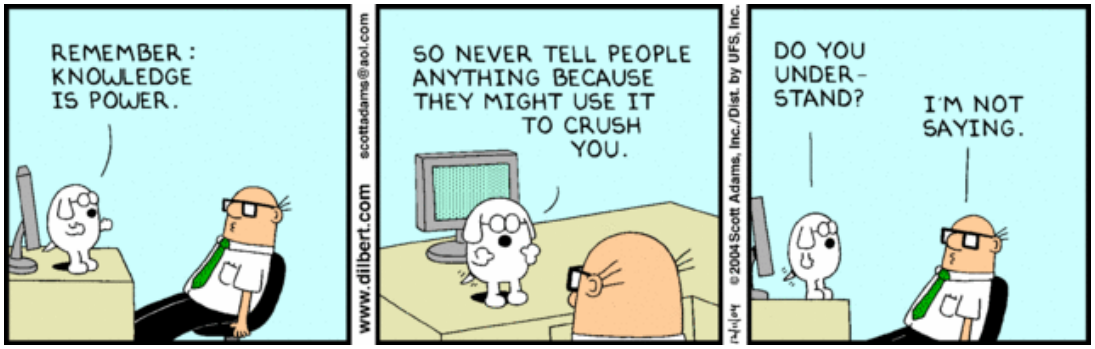

Figure 8.1 Knowledge is Power (Adams, 2004)

My KM capacity-capital architecture was designed to incorporate comprehension of the "power" that knowledge can have when its four capacity dimensions are professionally managed with the relationships that are needed for that knowledge to generate economic, cultural and social capital are nurtured. In this way, the team membership enabled a "power" effect that facilitated participants' improved membership of the faculty organisation and of the broader academic network through the collaborative pursuing of the team KM capacity objectives. However, that collective, combined team "power" effect was not like the individual power aspect portrayed in Figure 8.1 and highlighted by (Heisig et al., 2016). In this team, the KM capacity-capital "power" was more collaboratively co-constructed such that it was greater than the summation of all individuals' "power" in a multiplication effect that I contend was a "competitive advantage" (Deming, 1982) of the team.

This "power" advantage of the team, along with the "ambiminded" and adaptation notions of the individual participant human dimension as were discussed in Chapter 7, can be related to the positive economic, cultural and social benefits generated. That is, ambiminded individuals can could adapt their KM capacity construction to contribute to the status in this academic team context. For example, Owen highlighted how he had adapted his "T" preference to be more diplomatic so as to gain promotion, Ruby had adapted her "J" preference to accept constant

interruptions at her office door in order to perform her professional role, and Paul had adapted his "I" preference to become an international keynote speaker and to have an office layout that welcomed professional interaction. Without these individual personality ambiminded adaptions, the combined KM capacity power of the team, in their specific academic context, would have been reduced, and the attributes of capital lessened.

8.3.2 Collaborative, Co-Constructed Capacity

The nine participants were shown to be a diverse group on a deeper level (as was discussed in in RQ1). The diverse personal preferences existing within this team collaboratively co-constructed KM capacity (as was discussed in RQ2) to meet the objectives of the team and organisational levels. These objectives were themed around the team being endorsed as "members of the academy", being encouraged by the organisational level KPI objective to construct publications and research funding, and the economic, cultural and social capital relationships associated with that.

The KM capacity was shown in RQ2 to be influenced by four KM dimensions; process human, technology and context. Each KM dimension includes subdimensional aspects such as the participants' CISUS process activities, knowledge specialisations, MBTI personality preferences, ICT use and skill, and network engagement, as explored within RQ2. By all participants applying their individual KM capacity dimensional and subdimensional strengths, the participants generated a number of publications that were formally shared and utilised with the broader academic network, and that thereby achieved the organisational KPI goals.

In context of an academic research team, the use of the shared team publication outputs by the academic network, leads to citations. The more citations that a publication generates, the more

cultural capital that publication bestows on the author/s, their affiliated organisation/s and the publisher. That is, a highly cited publication can improve the author's social standing (social capital) and provide prestige (cultural capital), integrating the team members into the broader international academic membership network. From this perspective, authors with the KM capacity to construct a highly cited publication firmly establishes them as members of the academy. Publications can also generate economic capital from publication sales and by leading to professional employment promotion. Therefore the construction of KM capacity to produce a publication output has a relationship with the three forms of capital. Whilst it is difficult to quantify the value of the resulting forms of capital, especially in the short term, this evidence supporting the *how-why* linkage between KM capacity with forms of capital through construction of publications outputs is significant, if subtle.

Furthermore, social capital was consciously considered in the construction of KM capacity at the team level. Paul surmised in his interview that the team valued the "group" not just the task. Paul said: "I have worked with more task-orientated people before, and they're like charging elephants. They get things done, but they leave a wreckage of hurt feelings and resentments and so on that they're totally oblivious to or they might know about, but they don't care". This task versus team balance was recognised in the MBTI literature as an issue with a very high "T" preference (Myers et al., 2003) with regard to managing personal relationships.

However, Paul was quite conscious of the team's social capital – both within the team and at the organisational and network levels. Whilst the term "social capital" was never explicitly discussed within the team, I suggest that Paul innately understood it and the value of good relations, owing to his very clear "F" personality preference. Paul's involvement may have highlighted the group focus of the team, however all participants were observed to possess skillful

"F" diplomacy so as to avoid conflict in the organisational context. Therefore in this team there was evidence of a relationship between *how* KM capacity was constructed and a "group focus" with respect to the *why*, which was constructing forms of capital, including social capital.

To underline this KM capacity-capital relationship, Kandy expressed a similar valuing of the social and cultural capital within the team. Her view was that:

> It's not about the tangibles; that is how we are measured by others. My measure of worth in terms of staying and being involved in the team is that the intangible things are the most important – the interactions and the opportunities for growth and development because of those interactions.

Yet, despite their value, these "intangibles" are elusive and difficult to provide firm evidence of their existence. It would appear that, in this team, producing academic outputs was important; however, constructing and maintaining positive human dimension relationships and interactions were also vital. Compromising the human dimensional relationships may be considered worthwhile for other individuals, teams or organisational contexts, but as Paul and Kandy have confirmed separately, this team highly valued their social capital.

My ethnographic observations supported Paul's and Kandy's view that the team definitely had a group-orientated value and focus, and that achieving the tasks was secondary. For example, the team would agree to slip a task deadline back in order to reduce task pressure and to maintain team harmony. There were two occasions when the team meeting was cancelled because many members were consumed by other faculty task priorities. Also the team desired, but was not dogmatic about, achieving the book publication in 2012. Although that 2012 publication objective was actually achieved, and membership of the academy resulted, the deadline was secondary to

team harmony. Thus, the relationship between KM capacity output and social capital was evident within this team's collaborative culture.

This entwining of KM capacity and capital, and the value derived from good relations among the team, organisation and network, were further highlighted by Paul's additional comment:

> Our group is dialogical (rather than monological) which is about talking with one another, and also about listening actively to one another and really trying to understand other people's point[s] of views and experiences, and using those to filter into one's existing experiences, whereas, I mean, having a conversation with someone who stops talking when you talk, but doesn't actually listen at all and never incorporates another perspective into their own…

This dialogical aspect again highlighted the collaborative co-construction of KM capacity within the group, and how subtle, yet vital, the social capital nuances were for this team to operate effectively in this context.

The membership of this particular team, with their dialogical, group-orientated culture, enabled the team to achieve the KM capacity construction outputs of publications in conscious relationship with the forms of economic, cultural and particularly social capital. The evidence revealed participant engagement with the KM capacity process and human dimensions to foster team relationships and positive interactions across the organisation and network levels.

Furthermore, the activity of one participant engaging with a community group in order to explore and seek out grant opportunities had the effect of generating some cultural capital for the whole group, as that individual represented the team. This effect multiplied the resources of the team, as they were all working together towards a common objective. This multiplication effect

thus boosted the team's collaborative co-construction of KM capacity, and the subsequent forms of economic, cultural and social capital.

8.3.3 Funding

The economic capital of the academic research team formed a significant aspect, as without university funding, the team would have been dissolved (as is discussed in Section 9.6) and would have failed to achieve membership of the academy. There are several forms of funding – government, university and external grants. Each of these is discussed below.

In the context of the Australian regional university where this study took place, a significant proportion of the university funds in 2011 was provided by the Australian government. This government funding has always been an issue and remains so. A recent report lamented that the 2018 funding for regional universities would be capped at 2017 levels, and that "since student places were uncapped in 2009, there's been a 55 per cent growth in university enrolments from the poorest fifth of Australian households, and a 48 per cent growth in regional and rural university students" (Robinson, 2018). That is, during my data collection period, the study site university funding was actually increasing, and so the research team was operating in a time of relative economic prosperity, or as Senator Birmingham, the current Australian Minister for Education, said, resourced by "rivers of gold" (as cited by Robinson, 2018). This government funding resourced the university, which in turn resourced the team to construct their KM capacity to meet organisational KPI objectives and generate economic, cultural and social capital returns

The team participants were thus funded primarily by a grant provided by the case study university, the overarching organisation in which the team was contextualised. Without this grant, the team would have had limited funds with which to publish their book as it would have taken

longer to produce, as editing and typesetting would have been more laborious for the team, and the website development would have been slower. Therefore the opportunity to derive economic, cultural and social capital from the book publications (and from the associated website) would have been delayed. This showed how the KM process, human, technology and context dimensions associated with the KM capacity construction of the book publication and the website were all related with the economic capital of grant funding, and the cultural and social capital of the team and the university organisation's economic, cultural and social support of the team.

In this way, the findings support the theoretical KM capacity – capital architecture from Figure 3.5, with the how of the team construction of KM capacity having a direct why relationship with Bourdieu's (1986) forms of economic, cultural and social capital.

8.3.4 Team Identity and Brand

In 2011, the team refocused toward one common knowledge specialisation, which initiated the rebranding of the team identity, and a new team name was formalised by June 2011 (Case Study Team, 2011b). This rebranding of the team was strategic investment to better position the team with the membership of the academy.

I did consider naming the team in this thesis in order to reveal the context dimension impact the team brand name had, and to contextualise the broader analysis of the data. However, I deemed it would identify the team too clearly and thus compromise the confidentiality of participants. Suffice to state that the new team name and focus enabled participants to be associated with that team brand. In this way, participants were positioned within the academy network-level relationships which derived social and cultural capital to the participants.

Thus the rebranding gave the team more power in that it more clearly communicated the knowledge with which the team was engaging and in which the team was specialising. With this collective power of a "multi-million dollar" team and a clear knowledge focus, it was mutually advantageous to be collaborative within the group in order to be competitive at the organisational and network levels. According to Davenport (1997), the new frontier is in our minds, where a source of commercial advantage is the knowledge of people in organisations. The clear team identity and knowledge specialisation of the process dimension, and the collaborative culture of the human dimension thus helped to establish the competitive advantage of the team and related to all three forms of capital.

As the team developed under this new team identity and brand name, it also became more directly aligned with the KPI target measures directed upon it by the organisation, by which the team performance was judged. This need for reporting progress and achievement of the KPI targets was a requirement to maintain the team's funding, and thus its economic capital. The KPI targets encouraged the team towards producing academic outputs in the form of publications. Although opportunities for external grant funding, conference organisation and new research were also pursued, these opportunities did not mature during this study's time frame, and therefore the relationship of these KM capacity activities with the three forms of capital was not immediately evident.

Also, as was mentioned above, the recruitment of additional team members into the new team identity was further explored towards the end of this study's data collection. I understood that the rationale for growing the team numbers would increase process dimension energy and resource capacity to achieve more KPIs (cultural capital), expand the human dimension relationships and networks (social capital) and be more competitive in the university context

dimension to win additional grant funding (economic capital). That is, it followed the logic that, if "the team was greater than the sum of its parts", as discussed in RQ2, then a bigger team identity and brand would deliver bigger results. The desire to expand the team numbers seemed to be driven more by organisational level desires for increased KPI achievements than by the individual participants' desires.

I sensed that there was some concern among participants over this "grow bigger" push by the organisation versus the "collaborative co-construction" harmony that was evident in the existing team. However, as this team expansion situation occurred after my interviews, I do not have enough other evidence to substantiate these team-organisation level concerns. However, I concluded that the team expansion and rebranding were strategic shifts in order for the team to construct a greater KM capacity competitive advantage against other research teams, which could enable greater economic, cultural and social capital gains.

8.4 KM Capacity Outputs: Academic Research Outputs

The participants' engagement with the four KM capacity dimensions led to the construction of KM outputs. One notable example of these KM outputs was that, over the data collection period, I observed the participants constructing academic research outputs - in particular, a number of publications and conference presentations - that consequently influenced the participants' economic, cultural and social forms of capital, as is discussed in Section 8.4.1 and Section 8.4.2 respectively. This evidence informed the relationship between KM capacity and forms of capital and was the second theme to emerge from the data analysis, and that is KM capacity *outputs* as is discussed in this section. In particular, the maxim of "publish to prosper" is asserted in Section

8.4.3, along with consideration of the technology dimension influence on the KM capacity-capital relationship and outputs (Section 8.4.4).

8.4.1 Capital from Book Publications

All participants continued to construct their KM capacity outputs in the form of publications throughout the data gathering timeframe of my study. It was the combination of the participants' KM capacity dimensions that enabled an edited book publication to be written and published within just over a year. For example, all the participants devoted their time and effort to create, improve, store, use and share (CISUS) their distinctive perspectives and specialist intellectual knowledge, facilitated by various office technologies, in order to author their respective chapters, which were collated into an edited book and published in accordance with the academic context dimension principles.

In particular, it was observed that the book was a collaborative co-construction, as it was the participants' knowledge specialisations (as revealed by the Wordle in RQ1), and the team's socialising and combining of knowledge (Gourlay, 2006; Nonaka 1994) that enabled the final publication output. Participants benefitted from constructive improvement suggestions to their publications as provided by other team members, and positive encouragement and support were also regularly provided. In this way, the iterative, cyclic processes described by the CISUS model in Figure 2.4 was further supported, whereby participants would continually improve the quality of their publication knowledge output by sharing their created draft, and then incorporating feedback to improve the product before sharing it again. In this way, the final stored and shared version was often substantially refined owing to that collaborative co-construction culture.

Participants utilised their technology dimension skills to assist them in processing knowledge and producing their publications, as was revealed by the technology survey in RQ2, whether within their university office or elsewhere. The three main applications utilised for publication outputs were the word processor for editing the manuscript, the Internet for searching relevant existing knowledge related to the topic and email to correspond with other team members and to send drafts of the manuscript for peer review. Thus, the technology dimension enhanced the feasibility of producing the publications and their resulting quality, which in turn influenced the value of the outputs.

It was evident, based on the content of their book publication chapters, that, within the human dimension, the participants were further developing their knowledge specialisation niche, adding their own unique perspective related to their personality preference. Participants' investment of time and effort in progressing their knowledge output process stemmed from the perception that publishing their specialist knowledge insights offered some value to the context dimension, across the levels of the academic organisation and the international network.

The book publication subsequently generated all three forms of capital, both for the individual and for the team. For example, economic capital was derived directly from book sales and royalties, and indirectly from salary paid during the construction of the book as well as from future salary rises resulting from academic career promotion (see Section 8.5). The university (organisation level) also obtained a result from its salary investment in the form of a publication that counted as a research outcome. In this way, the publication derived cultural capital immediately upon publication, by achieving a significant research team KPI goal and by gaining formal recognition from the broader organisation and the network levels. The fact that all participants now had their own knowledge embodied in a book generated cultural capital

(Bourdieu, 1984, 1986; Erel, 2010) that was cherished in the academic context as a cultural marker of their productive knowledge specialisation (Trapido, 2015).

Further cultural capital also arose later, as academics at the network level formally engaged with the participants' publications, and thereby institutionalised the participants as formally cited authors. I must admit that, whilst holding the physical book that I co-authored provided pleasure and cultural capital, having my publication "cited" generated an even higher sense of cultural capital. Being cited provides some recognition that the words that I wrote were of "value" to someone else. For me, being cited was a new experience, distinctive if not unique to the academic context, that provided a sense of cultural capital worth that this publication is difficult to quantify.

I highlight two further capital aspects of this book publication. Firstly, I acknowledge that my "book author" title was a privileged outcome of being a member of this highly productive and entrepreneurial team. Whilst I did have to construct KM capacity to deliver my collaborative contribution to the book, in 2012 I lacked the KM capacity and the capital to publish a sole authored book. In this way, the team outcome was greater than the sum of its individual parts.

Secondly, it is envisaged that forms of economic, cultural and social capital arising from the publication outputs will continue to amass for each participant over the course of her or his respective careers. In terms of social capital (Bourdieu, 1986; Coleman, 1988, 1990; Putnam, 1993, 2000), all participants were now published authors within an esteemed peer group. In the context of academic work, sharing knowledge formally and publishing one's writings are admired as a prized step toward academic credibility, and even more so if people read and cite one's original publication (Trapido, 2015) delivering both cultural capital (as mentioned above) and social capital. The book publication was observed to have an immediate direct effect on the team's social capital, arising from peers across the broader organisation and network levels sincerely

congratulating the participants. Furthermore, for me, it is socially satisfying to realise that some of the predictions and insights that I published in 2012 are slowly eventuating in 2018, proving me correct. Importantly, my prognostications can now be academically critiqued on that citable formal publication evidence that remains "locked in" at the 2012 priority date, providing social capital in a way made possible by being published.

Economic capital also accrued over the longer term, in that the published book had the potential to earn financial returns in the form of royalties for the participant authors. However, at this six-year point after the 2012 book publication, it would appear that the book has directly generated minimal economic capital from book sale royalties. Specifically, my publisher account detailed that I earnt exactly AU$1.27 in royalties over 2017 from my book publication efforts, adding negligibly to my economic capital. Nevertheless, the fact that I am now (like other team members) a "royalty earning author" provides me (like other team members) with invaluable cultural and social capital as was discussed above.

Incidentally, in this study context, publication outputs generated most forms of capital during the *share* process of KM capacity construction because it was only when knowledge creations were published and shared with the broader network level that they could accrue economic, cultural and social capital value. However, in order actually to share some constructed knowledge output, the participants needed to engage with all four KM capacity dimensions.

Thus, there was a complex interrelationship between the KM capacity dimensions and the three forms of capital that this wholistic study revealed. The academic outputs of the team publications formed a significant aspect of the participant and team capital development, and whilst the exact economic, cultural and social capital participants derived from constructing this

KM capacity are difficult to quantify, this evidence established that a relationship does exist between constructing KM capacity and Bourdieu's (1986) forms of capital.

8.4.2 Capital from Conferences

Conferences form a special case of publication activity as whilst it is more ephemeral than a book or a journal, a conference generates one important distinction – the presenter constructs a social connection and capital relationship with the audience. The audience is often from the organisational or network level, and the presenter can gain immediate feedback on her or his work. All participants were regular conference attendees, as being in their positions enabled them to apply for dedicated university funding to participate in conferences, and participants presented at various local and international conferences during the data collection period. Paul further assisted with local case study university workshops and conferences as either convener, chair and/or presenter depending on his situational requirements, and in this way, Paul actively encouraged the creation and sharing of academic publications as KM capacity outputs. The team explored the option of organising and hosting a conference; however, publication outputs were pursued as the priority, and the conference did not eventuate over the data collection period. Technology dimension tools such as email, PowerPoint and Skype were instrumental to enabling participants to organise, present and participate in conferences.

Conferences provide opportunities to connect and converse with the network level peer group, leading to new ideas and to potential future KM collaborations. I contend that all participants derived some social capital from their personal conference engagements, and particularly so if they were presenters. Being issued with a "presenter" name tag provided a subtle cultural capital marker to the individual, as well as the opportunity to be published in conference proceedings. For example, Dave presented at a conference in Melbourne, and noted that other

attendees had invested economic capital to attend and hear him and other presenters share their knowledge; yet again, it was difficult to quantify the cultural and social capital involved. Dave recognised how attendees were respectful of the presenter's achievements and would often engage post-presentation, seeking to discuss ideas further and/or to build professional relationships, which further relates to social capital development.

8.4.3 Publish to Prosper

The evidence gathered in this study supported the notion that KM capacity is linked with the construction of economic, cultural and social capital, even though this linkage was rarely explicitly acknowledged by the participants. I have provided evidence to support that the team KM capacity produced the book and conference publications, which were related to forms of economic, cultural and social capital of the participants and the team as was discussed above. At the heart of KM and capital is the concept of value (Fairchild, 2002). Whilst the publications definitely provided some forms of capital value, it was not possible to measure and quantify the *lifetime* value and benefit of the publications; however, during this two-year data collection period some of the "value" was already evident to both the participants and the organisation/network.

The saying "publish or perish" (Case, 1927) is a maxim in the context dimension of academic work, acknowledging the relationship between publication and forms of capital. However, there are different capital values associated with the various publication options. For example, citation analysis is a method of assessing the influence of particular authors, publications, research field, and research institutions (Liu, 1993). That is, ranking systems exist of the various journals (Stoupas, Sidiropoulos, Gogoglou, Katsaros, & Manolopoulos, 2018), and publishing in the higher impact journal or with a more reputable publisher presumably can deliver authors more economic, cultural and social capital returns. Therefore, in a similar way to families in China pay an economic

premium to live near the more prestigious schools so as to be in the enrolment catchment area (Wu, Zhang, & Waley, 2017), academics want to be published in and by the more prestigious journals and publishers so as to gain cultural capital from being more frequently cited in association with that prestigious, higher impact brand, and also in the implicit hope that this cultural capital might potentially lead to economic capital in the form of royalties and/or future professional promotion. Similarly, ranking systems of the publication types (Bourke & Butler, 1996) exist, classifying peer-reviewed books, journal articles and published conference proceedings more highly than non-peer-reviewed publications. Thus academics pursue peer review not just as part of their improvement process, but also to increase intentionally the economic, cultural and social capital value of their published academic output.

In further support of the capital value of publications, there are some views that the publish or perish culture has emphasised quantity rather than quality (Paglia, 1992), and there is a view that publications can be considered pollution if they are not read or cited (Cambell, 2010). Therefore the participants utilised their KM capacity processes to maximise the capital value of their publications in their specialist knowledge area. As a result, the team publications were intentionally of a higher quality, in that the book project was actively pitched to and contracted with a respected international academic publishing company, the chapters were all peer-reviewed, and there was subsequent evidence of the book being purchased (royalties) and also cited. Indeed, for the book chapters appearing on the Researchgate.net website, there is an increasing number of book chapter reads and citations being reported.

It is recognised that the capital returns (in all forms – economic, cultural and social) from the book publication will be longstanding and that, in time, the book sales will accumulate. This KM capacity and capital relationship with the book's publication will continue over the

participants' whole career and perhaps even beyond their lifetimes, and the eventual capital that the book accumulates for the individual authors can really be assessed only at the end of their careers or lives, which could be many years hence. Therefore, only a longitudinal study would enable accurate analysis of a publication's total economic, cultural and social capital value.

Of course, no participant in this study intentionally aimed to write a publication that remained unread – all hoped that their words would generate some cultural capital prestige, some recognition from peers (social capital) and ideally a few dollars to reimburse the investment in the education to have the skill and insight to write those words (economic capital). Therefore, rather than align with the "publish or perish" mantra, I argue that the more desirable mechanism behind this KM-capital relationship, if we take the more positive view, is *publish to prosper*. The *publish to prosper* maxim summarises how participants apply their KM capacity to produce outputs that generate economic, cultural and social capital benefits, and this study has shed new light on *how and why* this process occurs.

Interestingly, a comment made by Emma in her interview underlined this publish to prosper maxim. Emma said: "I perceive that in order to be intellectual and reflective and thoughtful and those sorts of things, which one would imagine an academic and a researcher to be, you would be more likely to be introverted". In discussing that, Emma felt her being extroverted held less value (or capital) in this academic context. Emma also mentioned that "I'm less likely to be free flowing in my communications and ideas and things if I feel that I don't have the full trust or that I can't fully trust everybody with that information in such a way that it will not be somehow used against me inadvertently." This linked back to her preference for extroversion, and also to the value of publications in this academic context – that is, talking about one's ideas before formally publishing them introduces the risk of losing credit for that idea once it becomes public. This is similar to the

legalities surrounding inventions, whereby the inventor must not disclose her or his idea publicly or else risk losing the priority for the patentability of that product (see IP Australia). Yet Emma's comment suggested that keeping quiet about a great idea until it was formally published was a lot more difficult for extroverts than it was for introverts.

Introverts may be more inclined to write an idea down and to publish it which generates greater capital for them than the extroverts who may prefer to talk about it. In Chapter 2, there was a much cited SECI cycle of KM (Gourlay, 2006; Nonaka 1994) that identified "socialisation" of knowledge as a key component of KM process dimension. Interpreting Emma's concern, any verbal socialisation requires "full trust" to maintain confidentiality and to protect the potential forms of capital that may arise according to the publish to prosper mantra, and thus reveals the motivating relationships between the human and process dimension engagements within the academic context in the construction of KM capacity and forms of capital.

8.4.4 Technology Dimension Influence on KM Outputs

The KM capacity technology dimension, by facilitating the KM capacity outputs of participants in terms of the publication production, was evidenced as an enabler for the construction of capital. The participants' ICT skills and usage were revealed by the RQ2 technology survey analysis. Without their ICT skills and usage, producing the academic publication outcomes would have been more challenging. Of course, their knowledge could still have been manually CISUS processed, but the processes would have been slower and more laborious. Thus, the technology dimension was an enabler to facilitate and fast-track the construction of KM capacity that led to the formal publications, and this resulted in more rapid return of capital as was discussed above.

Incidentally, the technology dimension is rapidly evolving, as was highlighted in Chapter 2. Consequently, all participants indicated that they intended to develop their ICT capacities further, with interest being reported in developing cloud, social media, SharePoint, and podcasting ICT skills and use. Therefore the technology dimension relationship with economic, cultural and social capital suggested that the participants were actively developing additional ICT skills and uses in order to benefit further their future construction of KM capacity and to generate the resulting forms of capital.

The introduction of more wholistically integrated KM technologies and tools (Chuen & Kuan, 2011) during this study timeframe included the smartphone, SharePoint, web 2.0 tools and public wireless connectivity. These new KM technologies had a significant influence on further enabling KM capacity, and on the resulting forms of capital. However, these new ICT tools required economic capital to purchase and implement, including the time and training needed for users to gain the relevant ICT skills. Thus, KM can be expensive (Davenport, 1997). The evidence of this study revealed that the university organisation provided the economic capital to purchase the participants' technology dimension capacity discussed in RQ1 and RQ2 with regard to office ICT fittings and facilities. It was thus important to recognise that participants were socially and culturally privileged by the economic capital provided by the organisational level context to enable their KM capacity. In this way, those with the capital to purchase KM capacity technologies gain greater opportunity to generate forms of capital, which in turn can fund the purchase of additional KM capacity tools, in a cycle of KM capacity-capital accumulation.

The KM capacity technology dimension "knowledge reach" also influenced the three forms of capital. With ICTs, participants were empowered to construct KM activities productively, synchronously by video or telephone, or asynchronously via word processing and email, from

almost any location such as cafes, airports or hotels and also from their own home offices. In the future networked economy, work will no longer be a "place", only an "activity" (Massachusetts Institute of Technology [MIT], 2014). With the technology dimension facilitating their KM construction, participants' economic capital derived from claiming their salaried hours and producing royalty earning publications was increased.

Also the technology dimension's e-commerce capabilities supported international sales, reading and citations of the participants' publications, which earned economic, cultural and social capital. Additionally, social media technology enabled social and professional engagement with the international network level, and involvement in conferences and projects, generating subsequent economic, cultural and social capital benefits. Furthermore, participants' ICT skills are sought after by employers, producing economic and social capital gains from potential promotion related to technology dimension currency.

Another particular technology dimension tool that the team developed during the data collection period was the website. A direct link to the website has not been provided, to honour the anonymity assurance of my ethics approvals. I highlight here that legally the website provided a citable method of publication; however, participants did not really develop this less formal means of publication, instead pursuing more formal publication with respected, reputable publishers, which highlighted the previous comment about the social and cultural capital of the publisher being of higher value in this academic context. The website was really used only to provide an introduction to the team and so did not generate any significant output for the team KPIs. Consequently, the website technology did not receive a lot of team attention once it was online. However, even with the website being maintained for that short, initial period, it enabled anything on that website to be visible, citable, and potentially sellable across the whole network level, and

so offered an economic, cultural and social capital opportunity for all team members. This observation underlines the publish to prosper mantra, in that participants did not want only to publish, which they could have achieved via the website. Instead, participants sought to publish in the most respected and reputable way, which in this context was with the international publisher, after extensive peer review of the publications, so as to prosper from the greater social and cultural capital that accrued from this more formal publication method.

8.5 KM Capacity Outcomes: Academic Career Trajectory

The construction of KM capacity outcomes by way of the academic career trajectory of participants was the third theme emerging from the study evidence, linking participants' qualifications (Section 8.5.1), promotion (Section 8.5.2), salary (Section 8.5.3), office technologies (Section 8.5.4) and KM intangibility (Section 8.5.5) with Bourdieu's (1986) three forms of capital.

8.5.1 Qualifications Attained

This subsection considers the relationship between the participants' KM capacity qualifications and their three forms of capital. For the nine participants in the research team, their knowledge had been developed and nurtured over many years to enable the professional KM capacity required for their work, and their resulting qualifications formed a component of their economic, cultural and social capital (Brown, Power, Tholen, & Allouch, 2016).

One particular aspect to consider with the participants was that five of the nine had already been awarded PhDs, and three others were actively working on their PhDs, with one completing in the data collection period (refer to the demographic data in Chapter 6). These academic qualification achievements and career trajectory were the economic, cultural and social capital

result of many years of hard study and work through various educational development programs such as school, undergraduate degrees, post-graduate degrees and various other supplementary studies. Furthermore, the participants' titles (including Professor, Associate Professor, Senior Lecturer) had been hard won through promotion, in competition with fellow academics.

As one example of capital that such a qualification produces, Lucy progressed to finalise her PhD qualifications during the data collection period, which enhanced her cultural capital with a PhD title and award. In turn, this led to her being congratulated and admired by her peers, which was a clear boost to her social capital. Also the PhD increased her competitive advantage for seeking promotion, which she pursued. Her subsequent promotion provided her with greater economic, cultural and social capital within her organisational and network peer group, derived from her more prestigious job title and her increased salary package. My observations of participants' examples concluded that, as the participants' qualifications related to KM capacity increased, they became more valued not only internally within the team, but also externally within the university as rising academic stars, and also within the local community as respected members of society. This evidence revealed how the qualifications related to KM capacity influenced the capital value of the participants. In this way, improving one's qualifications (such as being awarded the PhD title) was related to improvements in one's economic, cultural and social capital.

One other point to note here regarding qualifications and capital was the economic cost of obtaining a qualification. I conservatively calculate that the real cost for each participant to obtain his or her PhD qualification, incorporating the lost income opportunity cost of doing their undergraduate and post-graduate study periods, is about half a million ($500,000) dollars in 2011 value terms.

In my particular case, which I can calculate more accurately based on actual earnings forgone in order to complete my undergraduate-masters-PhD study pipeline instead of engaging in income producing work, the cost is closer to one million (AU$1,000,000) dollars. The cost of the PhD qualification has been explored by other studies (Bexley, 2014) to conclude that the cumulative economic capital invested to obtain a PhD is substantial. In considering that the team contained eight PhD (or almost PhD) qualified participants, then I conservatively calculate that there were several million dollars of human dimension assets comprising this team. So, in effect, the economic capital behind the educational qualifications conservatively made this a "multi-million dollar team". However, the team never advertised themselves as a "multi-million dollar team". Also no participant mentioned seeking economic investment returns from their qualification, although it must be noted that all were already actually generating some economic return from their career trajectory, and the topic of a peer's promotion was occasionally mentioned.

One reason for this lack of focus on the economic capital of the PhD qualification, despite their cost to achieve, may have been due to the substantial cultural and social capital generated that somewhat satisfied the economic investment. For example, the community perception of the PhD qualification difficulty and specialty provides significant cultural capital. Like a military medal, the PhD cannot be bought; it can only be earned. Furthermore, the PhD provides the pre-nominal title, Doctor or Dr, which adds further prestige and cultural capital to the individual.

Whilst I never observed any of the participants boast about their PhDs, their Dr title always preceded them and naturally attributed cultural and social capital to them. So, the PhD qualification provided participants with a return other than economic capital in the form of cultural capital prestige, like an invisible medal on their chest and also social capital from community respect.

With regard to qualifications, it became apparent to me at the outset of this study that, despite my substantial qualifications, I was the least qualified researcher in the team. In the early days of fieldwork, the ethnographer is like any layperson or new recruit, faced with the practical need to make sense of a social setting (Hammersley & Atkinson, 2007). Retrospectively, I did feel like a new recruit in an experienced team, as all participants had already completed their PhDs or were in the final stages thereof, and some had significant post-doctoral research experience. Therefore, as I sought to understand the team's KM capacity dynamics, it became apparent to me that my limited research experience reduced my cultural and social capital in the team context. Whilst this was factually true given my limited research experience, I did bring my industry consultancy experiences and knowledge specialisation to the research team table, and the other participants were always very welcoming, inclusive and collaborative. However, I was quite conscious of my unconscious incompetence (Dunning & Kruger 2000) being obvious to the competent researchers in the room, and I strived to prevent my "new recruit" status from jeopardising my research. This revealed the subtle relationship between the human dimension of KM capacity, being my qualifications and experiences, and my cultural and social capital.

Overall, the KM capacity dimensions that had enabled participants to obtain their PhD qualifications were the result of much hard work. Although each participant must have possessed some innate genetic ability (nature) to achieve this level of performance, the economic cost of the PhD qualification was significant, but it did return economic, cultural and social capital for the participants though their career trajectory effect. This example provided further evidence of the KM capacity relationship with the various forms of capital.

8.5.2 Promotion Earned

During the study data collection timeframe, I considered that the team was in the performing stage of their development cycle (Tuckman, 1965), which was part of the reason why such productive KM capacity was constructed in this period. However, towards the end of the study, the nine-member team was moving into an adjourning stage (Bonebright, 2010; Tuckman & Jensen, 1977), which influenced the human dimension dynamics and capital. As the team approached the adjourning stage, several members were completing their PhDs and post-doctoral activities and were looking for new opportunities.

For example, two participants were obviously applying for roles at other universities at the time of data collection, as they accepted positions soon after data collection and relocated to take up more highly ranking positions at other universities. Another two participants were also subsequently promoted within the case study university, and so were also obviously engaging with the promotional process, which involved completing a substantial document detailing one's academic skills, including qualifications, publications, grants, technology skills and knowledge specialisations – all KM capacity-capital related constructions that have been mentioned in this thesis. Thus, four participants were definitely promoted as a result of their KM capacity constructions, and, whilst the team membership was not solely responsible for their promotion, their team achievements would have certainly improved their competitive advantage over their peers to gain their promotions.

In this study, for RQ3, I have provided qualitative evidence to support the assertion that this team constructed KM capacity and that as a result the team produced some capital returns. However, calculating a quantifiable measure of KM capacity-capital value remains a challenge. This reiterates the above comment regarding participant promotion and quantifying exactly how

much "worth" the team KM capacity construction activity added to participants' promotion eligibility. This quantification of one's value seems to be developing, however, as I have recently noticed that academic social media sites like researchgate.com are providing an "academic ranking", and that the linkedin.com site is doing something similar. This phenomenon has been noticed by others, in that cyber-networks are emerging as a major source of social capital (Lin, 1999).

Thyerefore it could, in the future, be possible (and socially acceptable) to measure the various forms of capital that one gains from constructing KM capacity, such as publishing a book or presenting at a conference through correlating the resulting boost in one's ranking on these social media sites. At this time, however, whilst the capital value of KM capacity constructions is possible to consider *qualitatively* as this thesis has done, it remains a challenge to assess the value gained *quantitatively*, which is suggested in Chapter 9 as a potential future avenue for research. Of course, for the four participants above, their attributes must have somehow been calculated to possess competitive advantage and to be more promotable than others, which highlights my point that evaluating one's "capital value" must be possible.

8.5.3 Salary

During the timeframe of this study's data collection, all participants were paid a salary by the case study university to perform their academic duties, which involved all four KM capacity dimensions and the three forms of capital. For example, the salary component linked directly with the KM process dimension, as in order to earn their salary (economic capital) in this context, participants were required to create, improve, store, use and share their specialist knowledge with the research community and with the university students whom they were teaching, which also involved human and technology dimension aspects. Also the participants' salary package

encouraged them to conduct research and to share their knowledge with academic peers via publications and conferences.

As discussed in the above section, there was evidence that Lucy's KM capacity construction led to increased economic capital predominantly through the salary increase from her promotion. Lucy, as well as other team members, had skills in a particular priority area in the Australian economy, which offered the potential for further promotion and increased economic capital.

Also participants' MBTI preferences and "ambiminded" skills assisted them with their human dimension KM activities, as was discussed in Chapter 6 and 7, to perform in their duties and roles more effectively and to justify more comprehensively their ongoing employment to earn their salaries. There was a technology dimension component of the salary, as all participants occasionally worked remotely, performing their salaried duties through ICT connectivity. The contextual component of the salary payment is related to the amount paid, as the university had set award rates that they paid staff members to perform particular duties and roles, such that an level A academics would earn a salary of "x" and once they had gained more KM capacity skills and knowledge and were promoted to a higher level B academic rank, they would earn more salary.

Through the payment of salary, the participants' KM capacity can thus be further related to the three forms of capital. For example, the salary related directly to economic capital, as that salary was paid in monetary form, and enabled the participants to pay for their lifestyle activities. The salary paid placed the participants in a mid to high earning income bracket compared with the reset of the Australian population, and therefore assisted the participants to amass economic capital.

The salary also enabled the participants to develop their cultural capital, as the funds enabled them to purchase tickets to attend social events, and also to purchase prestige items such as clothes,

cars, houses and holidays – all of which assisted them in building their cultural capital in the society. For example, participants who travelled to attend conferences often added on a holiday in that locality, which drew on their economic capital to enrich their cultural and social capital.

The salary also enabled the participants to build social capital, as by attending and hosting social events they engaged with peers in particular social circles, leading to their social enrichment. For instance, whilst the university provided some funds to attend conferences, additional costs needed to be met by the participants, which would draw on their economic capital of salary savings.

8.5.4 Office Technologies

Participants' office technologies were provided on the basis that they were working in a particular position within the university, and any promotion in role or position could increase the likelihood to be provided with a better office. There was, and still is, an element of prestige, or cultural capital, in possessing the latest technological gadget. In the team, the iPad had a particular prestige factor that socially positioned Wal as an early adopter and that attracted positive attention. Yet, he also gained the functional KM capacity of that iPad, which enabled him to be more productive was discussed in Chapter 7, and so to be more competitive for promotion. Therefore the latest office technologies were related to the economic, cultural and social forms of capital (Bourdieu, 1986; Coleman, 1990; Erel, 2010; Putnam 1993). The office emotional related technologies were also a form of cultural capital. Wal, Paul, Kandy and Ruby all displayed items that were subtle prestige markers – a photo of them in some desirable context, an item that offered a talking point that elevated their social standing, a desirable object such as a lamp – and so could therefore be considered markers of cultural capital (Bourdieu, 1986; Erel, 2010), and so the provision of the office place in itself can be considered to provide a form of a social and cultural

capital. Another example, is that the corner "C" suite office holds more prestige and power as they are usually occupied by executives, sending subtle signals that relate to all three forms of capital. In this case, all the participants were provided with attractive offices and associated office furniture and facility technologies, as discussed in RQ1, which consequently can be related to all three forms of capital.

On another note, this study has supported the relationship between the KM technology dimension and the construction of forms of capital. All participants utilised ICTs, to some extent, in accordance with the KM capacity-capital architecture, as was discussed in Chapter 7 and above. It is noted, that the rapid revolutions in the technology dimensional introduces risks such as cyber centrality, cyber reliance, privacy intrusion and data loss/theft, as mentioned in Chapter 2. Thus, knowledge workers must manage their technology dimension risks so as to continue to enable the construction of the outputs and outcomes that in turn construct the forms of economic, cultural and social capital, even in a contested context. Fortunately, the participants in the team were managing the technology dimension risk to their forms of capital as best they could at the time and avoided any critical issues during the study period.

8.5.5 KM Capacity Intangibility

The intangibility of knowledge was highlighted through this theme on the outcomes of KM capacity influencing the participants' career trajectory. This intangibility became most obvious to me when Paul mentioned one aspect of his academic career trajectory in his interview that gave rise to a thought experiment. When talking about the knowledge that he processed and his technology dimension backup process, he pointed out that, "If my external hard-drive was stolen, it would be a catastrophic loss to me, yet the value of it to the thief would be nil".

Extrapolating this situation hypothetically, Paul's "nil value" comment highlighted that the real economic capital of this knowledge was not stored in the technology dimension of the device, nor in the KM processes that he deployed. I inferred that the real economic value resided intangibly, in Paul's head, in the human dimension, based on how well that he understood the specialist knowledge stored in that technology dimension, and how he could construct and create new knowledge related to that. It had taken many years of hard work for Paul to achieve his particular KM capacity, and the depth and complexity of all that knowledge could not just be transferred to a hypothetical thief by merely stealing Paul's files.

Those files on the hard-drive were valuable only to Paul as they contained his publications, drafts and ideas, and they represented many years of past KM capacity constructions and thus formed a foundation for his future salary earnings and publication royalties. This showed that Paul's KM capacity was stored in the technology dimension of the hard-drive and also less tangibly, in the human dimension. Given that the university correspondingly paid Paul his salary to apply his depth of knowledge to contemporary issues, this thought experiment also showed how the less tangible KM capacity of the human dimension related to the forms of economic, cultural and social capital. In that sense, the academic career trajectory of participants continued to increase for all participants during the data collection period, based on the depth of their intangible KM capacity continuing to increase as a result of their team experiences and their academic outputs produced.

Continuing this thought experiment, a similar conclusion resulted from considering that all but one of the participants had a PhD or were actively working towards a PhD qualification, as was stated in the RQ1 analysis. The same hypothetical thief who stole Paul's hard-drive could also steal his framed PhD certificate hanging on the wall. Yet again, that PhD certificate artefact alone

would provide the thief with little economic, cultural or social capital, as the value was not really in the tangible wall hanging, but rather intangibly held within Paul's brain, derived from his specialist knowledge of his PhD topic. It was the KM capacity developed by earning the qualification that warranted the participant earning his resulting economic capital from the salary and the cultural capital associated with his job title. Thus, Paul's hypothetical thief further highlighted the subtle, somewhat intangible, yet direct relationship between the four-dimensional construction of KM capacity and the forms of economic, cultural and social capital, as was theoretically depicted in the KM capacity – capital architecture in Figure 3.5.

8.6 The KM Capacity-Capital Architecture

This study provided evidence to explain that the KM capacity relationship with capital was one reason why KM work importance is increasing. The category of KM workers has existed for centuries (e.g., teachers). However, the workforce has recently grown in number and also in importance, so they are attracting greater interest (Davenport, 2005). In the case of the knowledge workers in this study, the team worked to create, improve, store, use and share knowledge in the process dimension, with improved technology dimensional tools, by collaborating on their knowledge specialisations and personality strengths to co-construct their combined KM capacity.

Whilst the team's academic output of publications continued beyond this study's timeframe, the team KM capacity during this study was significantly productive and was specially acknowledged by the faculty. In RQ1 and RQ2 it was revealed that the KM capacity of the team was strengthened by the collaborative combination of participants' KM process, human and technology dimensional diversity (Matthews, 2015b). In RQ3, this KM capacity was shown to relate to Bourdieu's (1986) forms of economic, cultural and social capital through the three themes

of KM capacity objective, outputs and outcomes, as evidenced by team membership, collaborative co-construction, funding, team identity/brand, publications, conferences, qualifications, promotion, salary and office technologies.

The relationship the construction of KM capacity has with Bourdieu's (1986) forms of capital was explained theoretically in Chapter 3, with the interactions depicted in Figure 3.5: KM capacity-capital architecture. The evidence analysed in this thesis supported and defended this theoretical architecture, with its combined construction of the four KM capacity dimensions enabling a competitive advantage that can lead to the three forms of capital, and therefore this finding forms a major theoretical contribution of this thesis. This KM capacity-capital architecture has been presented for peer review in publications during this PhD candidature (Matthews, 2014, 2015b).

However, this Figure 3.5 architecture was designed around the pragmatic limitations of this study, and was bounded by Bourdieu's (1986) three forms of capital. My broader reading of the literature suggested that Bourdieu's three forms of capital are not necessarily wholistically comprehensive, as was alluded to in Section 3.6. For example, incorporating the notions of environmental/ecological capital (Moore, 2003; Newell, 2011) into my architecture would appear to have merit given the current extinction crisis (Barnosky et al., 2011) in this Anthropocene era of climate change (Blasdel & Morton, 2017). Environmental capital seems to be beyond the scope of the economic, cultural and social forms of capital, and so was not considered in this study. Also, intellectual capital, with its three aspects of human, relational and structural capital (Bueno et al., 2014; Longo-Somoza et al., 2015) may offer additional aspects that could be included within the "other" capital. Indeed, there may well be many additional forms of capital that exist as "other" forms of capital.

Therefore, as the culminating result of this study, I have refined my Figure 3.5 architecture by foreshadowing the inclusion of "other" forms of capital, as is depicted in Figure 8.2. This refinement results in a more wholistic, generalised, KM capacity-capital architecture that facilitates an opportunity for future researchers to apply and adapt further.

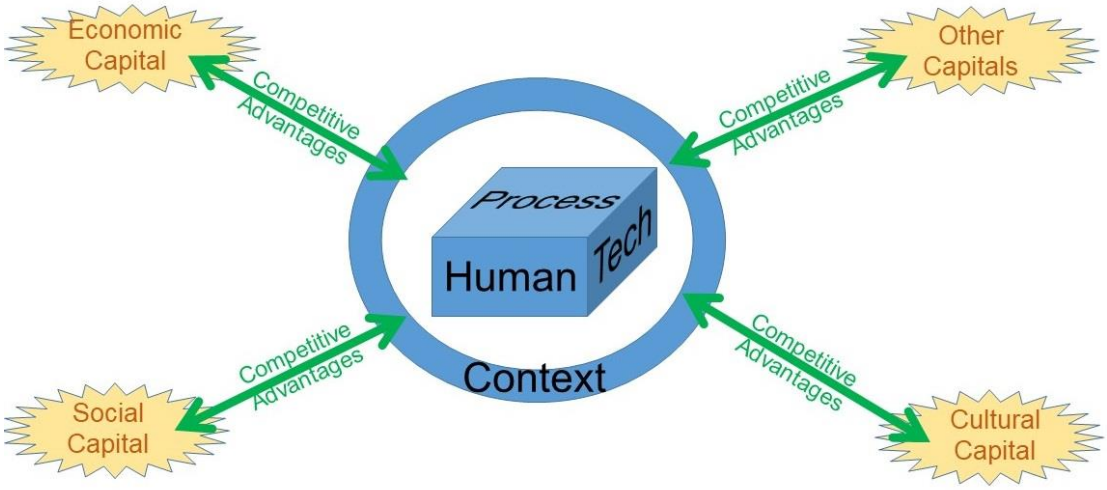

Figure 8.2 The KM Capacity–Capital Architecture (Developed for this study)

Figure 8.2 shows how the KM capacity dimensions of process, human and technology are contained within the "bubble" of the context dimension. That is, in this study's context bubble the construction of KM capacity in the process, human and technology dimensions was as reported in Chapters 7 and 8. However, in a different context "bubble", being another team, the construction of KM capacity in the process, human and technology dimensions may be significantly different, with each context presenting a unique case.

The construction of KM capacity introduces some form of competitive advantage, as supported in the literature (Davenport & Prusak, 2000; Drucker, 1988, 1993; Kakabadse,

Kakabadse, & Kouzmin, 2003; Nonaka, 1994). In this study case, the participants' process, human, technology and context dimension capacities resulted in the team producing various publications and presentations, which provided the team with the competitive edge that led to the advancement of an academic career trajectory and the resulting forms of capital, as was discussed above. Therefore, the notion of competitive advantage remains incorporated in this architecture.

The construction of KM capacity results in Bourdieu's (1986) forms of economic, cultural and social capital being produced, as supported by the above discussion of empirical data collected and analysed within this study. The foreshadowing of "other" forms of capital facilitates the incorporation of additional forms of capital (e.g., of environmental capital) as needed, thus providing a more generalised architecture for the wholistic understanding of this KM capacity-capital relationship, and how and why KM is important.

The findings that arose throughout this study's triangulating analysis of collected data resulted in the refinement of the KM capacity-capital architecture from Figure 3.7 towards that presented in Figure 8.2. Figure 8.2 is thus my concluding contribution to explaining *how* and *why* KM is important to knowledge workers, in response to the overall research problem.

8.7 Conclusions to RQ3

This chapter considered all the data collected during the research in order to address RQ3 of this research study. The chapter presented evidence to show that, in this context dimension of academic work, the technology dimension enabled engagement with the global "academic membership" network of the human dimension, that empowered the human dimension of the participants to contribute their specialist knowledge via the process dimension (CISUS activities),

which resulted in the construction of the "academic outputs and outcomes", which in turn constructed the forms of economic, cultural and social capital.

This connection among the *what-how-why* RQs was supported by the evidence presented, and the literature considered, to depict the conceptual connection in the theoretical KM capacity-capital architecture developed in Figure 8.2. This architecture presented a feasible intellectual bow for knowledge managers to draw, and a realistic bridge for industry knowledge workers to traverse practically, so as to help to address the elusive, missing *how-why* link in KM comprehension that I hear being so insistently called for in the rigorous research results of Heisig et. al (2016).

Therefore, the RQ3 findings supported the notion that in the context of this academic research team, the construction of KM capacity in the emerging themes of objectives (membership of the academy), outputs (academic research outputs) and outcomes (academic career trajectory) provided evidence of the relationship with Bourdieu's (1986) forms of economic, cultural and social capital.

This relationship was depicted in the revised KM capacity-capital architecture in Figure 8.2. The RQ3 findings revealed the complex interrelationships influencing why knowledge workers purposefully construct their KM capacity. This leads into Chapter 9, where the overall RQ findings are presented and the study's contributions to knowledge are addressed.

9. CONCLUSIONS

9.1 Introduction

In this thesis, I have presented my exploratory, ethnographic analysis of data from a single-site case study of a research team in an Australian university's (then) faculty of education.

Chapter 1 of this thesis outlined the research problem and RQs, while Chapter 2 reviewed the literature relevant to KM, and synthesised the four dimensions of process, human, technology and context. A conceptual framework was developed in Chapter 3 to define KM capacity, which was utilised to frame the data collection and analysis chapters. Next Chapter 4 outlined the research methodology and case study approach, and Chapter 5 explained the data collection and analysis techniques used. Chapters 6, 7 and 8 provided analyses of the data collected during the research process pertaining to RQs1, 2 and 3 respectively. The data analysis was structured to consider *what* the participant profiles were (RQ1), *how* they constructed their KM capacity within the process, human, technology and context dimensions (RQ2) and *why* they did so (RQ3). Consequently, this case study analysis of RQs1, 2 and 3 data sets form the evidence that is current and relevant to support my learning and scholarship that led to the development of the KM capacity - capital architecture at Figure 8.2.

9.2 The Structure of This Chapter

A summary of the key research findings is provided in Section 9.3, recapping the answers to each of the three RQs. This leads to Section 9.4 and a discussion about the contributions to theoretical, methodological and practice-related knowledge that this study provides. Section 9.5

suggests opportunities for further research by noting insights and issues identified within this study, as well as aspects that were beyond the scope of this study. Section 9.6 mentions post-data collection insights to add context dimension completeness to this study. Section 9.7 revisits my biographical researcher situation and Section 9.8 concludes the chapter, and this thesis.

9.3 Key Findings for the Three RQs

This section discusses the key findings to address the three RQs. This study triangulated data from various data sources to analyse the *what*, *how* and *why* of participants' KM capacity construction, within this particular context, with respect to the influence of the participants' process, human, technology and context dimension differences. As discussed in Section 1.6, I acknowledge that this case study it is bounded in time and place to this particular Research Team in 2010-2012 and that the study was sufficiently detailed and comprehensive to obtain and analyse appropriate evidence to answer the RQs. The response to each RQ are now considered with regard to highlighting contributions to knowledge.

9.3.1 RQ1 Findings: The KM Capacity Profiles of Participants

The findings for RQ1 provide a KM capacity profile of *what* the participants were in the context of a university research team. Key findings were the team's diversity, and the existence of the individual, team, organisational and network levels involved in the construction of KM capacity, as elaborated below.

9.3.1.1 Participant Profile Diversity

Data from various data sources were analysed to provide a KM capacity profile of the participants, across all four of the KM capacity dimensions: process (Section 6.3); human (Section

6.4); technology (Section 6.5); and context (Section 6.6). Comparison of participant profiles showed that, at the surface level of their human dimensional demographics, the participants appeared to be similar. However, when additional data were analysed at a deeper level, with greater granularity, significant diversity was revealed among the participants in the KM capacity dimensions of process, human and technology. That is, participants were each engaging with the CISUS processes in an individual way, had unique knowledge specialisations, reported diverse MBTI preferences and were using a multitude of contemporary technologies. The fourth KM capacity dimension - context - remained similar for all participants as they were all working in the same team and in the same regional university organisation. The KM capacity profiles of the participants enable the reader to obtain an evidence-based understanding of who the participants were, at both surface and deep levels, and of the diversity among them. The team KM profile was in turn constituted by the combination of all participant's KM capacity profiles.

9.3.1.2 The KM Capacity Construction Concept

The findings enabled the development of the KM capacity construction concept in Figure 6.43, to assist in understanding the process flow across the various KM context levels, reflecting who (individuals, team, organisational and network levels) were engaged in constructing KM capacity in this study context. That is, the analysis of the context dimension data showed not just the involvement of the individual and team in constructing KM capacity, but also the involvement of the organisational and network levels, revealing this broader context dimension aspect of who this case study team was, and the organisation and network levels with which they engaged.

Overall, the RQ1 findings provided a KM capacity profile of *who* the participants were as members of the team in the university faculty context, revealing process, human

and technology dimensional similarities and differences among the participants, to inform the RQ2 analysis.

9.3.2 RQ2 Findings about How KM Capacity was Constructed

RQ2 allowed an investigation into *how* participants constructed their KM capacity across all four of the KM capacity dimensions, in an attempt to consider the whole of the metaphorical "KM elephant" introduced in Chapter 3. The analysis revealed insight into the complex reality of *how* KM capacity was constructed, with key findings being discussed below.

9.3.2.1 The Process Dimension

Within the KM process dimension, the participants' engagement with the CISUS processes was analysed in Section 7.3, revealing how participants created, improved, stored, used and shared their knowledge, highlighting the diversity in how participants constructed their KM capacity.

For example, within the KM *create* process, there was evidence of participants' use of various "creative zones" and "spark and burn rates", which influenced where and when, as well as the creative dynamics relating to how, they constructed their KM capacity. In the *improve* process, participants established a knowledge baseline to improve upon, engaged in team discussions to improve their ideas and frequently utilised peer review processes to improve their knowledge outputs prior to publication.

To *store* knowledge, the team used informal meeting processes, which proved quite effective and which provided an auditable email trail of team project data and correspondence that were filed by each participant in a decentralised way, often with multiple copies of a document residing on various participant hard-drives. A combination of paper and electronic files was still maintained by all participants, as a preferred choice of some participants, although there was an increasing

trend toward the use of digital storage facilitated by the technology dimension. For the *use* of knowledge, participants revealed an increasing use of digital knowledge sources to co-construct publications collaboratively. The publication process was utilised in various ways to *share* knowledge within their external network, the organisation and the team.

Overall, this variety of participant CISUS processes contained in the process dimension was mostly constructed individually and informally, rather than designed and directed by the team or the organisation, and this led to a diverse and decentralised co-construction of KM capacity owing to the combination of alternative KM approaches. For example, "INFP" Paul adopted and applied his own CISUS processes, which were different from those of "ISTJ" Lucy, and other participants did likewise. The team's variations on CISUS processes were collaboratively combined to enable productive KM capacity outputs in the form of unique publications. Thus, this study showed the scope and complexity of the KM process dimension through wholistic CISUS analysis, rather than by focusing on just one process, such as knowledge sharing.

9.3.2.2 The Human Dimension

Within the human dimension (Section 7.4), each participant had developed a particular knowledge specialisation and that participants were somewhat influenced by their MBTI personality preference in terms of how they constructed their KM capacity. The blending and combination of this human dimension diversity in collaboratively co-constructing knowledge outputs introduced the "Together we are more than the sum of our individual parts" finding, as the participants' various insights and efforts produced a KM capacity output that would have been difficult for participants to have achieved working alone. The book publication provided the main evidence of this, as this output could not have been completed in the timeframe without the collective team synergies.

Also the "perceived personality" of the team and organisation was analysed, revealing some consensus in terms of the result that aligned with my own perceptions. This provided evidence to support the contention that some participants had to adapt from their personality KM preference to fit the team or the organisational KM context. This endorsed the "ambimindedness" insight, with perhaps "INFP" Paul being the best example of ambimindedness given his fluency and finesse with the complete opposite MBTI dichotomy requirements of the "E_TJ" team and faculty. This research thus revealed how the KM human dimension variations and diversity among participants led to differing perspectives being socialised (Gourlay, 2006; Nonaka 1994), and how the team valuing and incorporating this diversity of perspectives served to strengthen the team KM capacity through collaborative co-construction.

9.3.2.3 The Technology Dimension

Within the technology dimension (Section 7.5), participants' ICT use and skills were considered, revealing a variety of technologies used and a diversity of ICT skills within the team. However, it was found that the main ICTs used by participants to enable their KM capacity constructions were MS Word, email and the Internet. Also, the participants pooling their diverse ICT skills as a team, they constructed a broader KM technology capacity, and this again highlighted the "together we are more than the sum of our individual parts" finding. In particular, the early adoption of a new technology by any one participant enabled the other participants to observe and evaluate the value of that technology to them, resulting in their being socially influenced to adopt or reject new technology. Examples of this were the iPad, Dropbox cloud storage, Skype and SharePoint, all of which were explored by individual team members.

Each specific technology example was adopted in different ways by each participant, and the overall result of the team's diverse technology use and skill was that the participants' collective technology dimension skills combined and also evolved as new technologies became available, to

enable the team to possess collaboratively the KM technology dimension capacity to deliver KM outputs. Furthermore, I found that the different technology adoptions were actually a strength of the team, rather than a weakness, as collectively the total technology dimension capacity of the team was equal to, or perhaps greater than, the sum of its diverse individual technology parts.

9.3.2.4 The Context Dimension

Within the context dimension (Section 7.6), the team KM capacity construction was found to be influenced by the team development life cycle maturity, which was identified to be in the performing stage (Bonebright, 2010; Tuckman & Jensen, 1977). This performance stage maturity enabled a publication output quality and productivity honed during the forming, norming and storming stages. Also, the team had a professional and collaborative culture that was also noted to be quite entrepreneurial, which was different from the university's bureaucratic organisational culture. This entrepreneurial culture influenced how the team environment attracted and motivated participants to construct their KM capacity and was a contributing aspect in attracting other academics to seek to join the team.

The KM capacity construction concept developed in Figure 6.43 from the RQ1 profile analysis also helped to explain further how the participants engaged with the team, the organisation and their external network to deliver the organisational KPI goals related to their KM outputs. This concept showed how the process, human and technology dimensions interacted across the individual, team, organisation, and network levels, and provided a wholistic view of how KM capacity was constructed.

At the broader organisational and network levels of the context dimension, there was ongoing change and evolution. However, these changes were consistent for each participant, and had a similar impact on all. The participants did strive to deliver on the KPIs and focusing on producing publications as their main KM capacity outputs, and they did this by improving on their

knowledge specialisation baseline, using the technology tools that they had available. In this way, the context dimension had significant influence on the construction of KM capacity that warranted its inclusion in the wholistic KM capacity architecture.

Thus the key finding that emerged for RQ2 was that the team collaboratively co-constructed their KM capacity by combining the participant diversity across the process, human, and technology dimensions, and within the team's context dimension, to have the effect that "Together we are more than the sum of our individual parts".

9.3.3 RQ3 Findings about Why KM Capacity was Constructed

RQ3 explored *why* participants constructed their KM capacity, analysing specific aspects of the team's process, human, technology and context KM capacity constructions in relation to specific forms of economic, cultural and social capital (Bourdieu, 1986). Three themes emerged from the data analysis regarding KM capacity objectives (membership of the academy), outputs (publications) and outcomes (career trajectory). The findings revealed the interrelationship among the four KM capacity dimensions and the forms of capital, helping to explain *why* KM capacity was purposefully constructed, as was summarised in Table 8.1. The RQ3 findings supported and enabled refinement of the KM capacity-capital architecture which provides a contribution to theoretical knowledge as discussed in Section 9.4.

9.3.3.1 Objectives: Membership of the Academy

The membership of the academy (Section 8.5) was the first theme identified in the study, evidenced in team membership, collaborative co-construction of KM capacity and funding. This evidence revealed a relationship with economic, cultural and social forms of capital

(Bourdieu,1984, 1986; Coleman, 1988, 1990; Erel, 2010; Putnam, 1993, 2000), as was summarised in Table 8.1.

9.3.3.2 Outputs: Research

Various academic research outputs (Section 8.3) were constructed by the team KM capacity - in particular the production of publications and conference presentations. These research outputs led to economic capital from royalties, cultural capital from citations and social capital from peer recognition (Bourdieu,1984, 1986; Coleman, 1988, 1990; Erel, 2010; Putnam, 1993, 2000), as was summarised in Table 8.1. Incidentally, it was found that it was during the share process of KM capacity construction that the most economic, cultural and social capital value was accrued. However, in order to share their constructed knowledge, the participants engaged with all four KM capacity dimensions. Thus, this wholistic study assisted comprehension of *how and why* the complex, interrelated aspects of KM capacity construction delivered outputs that in turn could generate forms of economic, cultural and social capital.

9.3.3.3 Outcomes: Career Trajectory

The academic career trajectory of participants (Section 8.4) was linked with evidence of participant qualifications, promotion, salary, office technologies and KM capacity intangibility, all of which related to the forms of economic, cultural and social capital (Bourdieu,1984, 1986; Coleman, 1988, 1990; Erel, 2010; Putnam, 1993, 2000) that KM capacity constructs, as was summarised in Table 8.1. That is, this study provides evidence to show that the eventual outcomes of constructing KM capacity can be related to Bourdieu's (1986) forms of capital in a way that helps to explain how and why KM workers build KM capacity and informs research problem answers.

9.3.4 Research Problem Answers

Finally, the above summary of this study's RQs1, 2, and 3 data analysis findings were detailed in Chapters 6, 7, and 8 respectively, addresses the overarching research problem of "*How and why do knowledge workers build KM capacity?*". The study evidence revealed that the participants' KM capacity process, human, technology, and context dimensions were interrelated with the forms of economic, social and cultural capital, as was depicted in Figure 8.2. I therefore contend that one reason why these particular knowledge workers were motivated to construct their KM capacity arose from their desire to attain these forms of capital. This contention helps to explain how and why participants invested their efforts in constructing their KM capacity and it provides one answer to the research problem. This research problem insight suggests that further wholistic studies, such as this one, will further inform this KM capacity-capital relationship.

9.4 The Contributions to Knowledge of This Study

This research has generated definite and substantial contributions to theoretical, methodological and practice-based knowledge, as is addressed in each subsection below. This thesis contributes to the important and growing educational and management issue addressed in the research problem, and its accompanying three RQs.

9.4.1 Contributions to KM Theory

Several contributions to KM theory are proposed as a result of this study. These include the development of the CISUS model to explain the KM process dimension, support of the four-dimensional KM capacity model and the culminating KM capacity-capital architecture contribution.

9.4.1.1 The CISUS Model

Within the KM capacity process dimension, this research reviewed existing KM theories (Bernbom, 2001; Davenport & Völpel, 2001; Despres & Chauvel, 1999; Kasvi, Vartiainen, & Hailikari, 2003; Nissen, Kamel, & Sengupta, 2000) to synthesise five theoretical processes that participants utilise in constructing their KM capacity: the create, improve, store, use, and share (CISUS) processes (Matthews, 2010a) were discussed in Chapter 2. The resulting CISUS model in Figure 2.6 provided a contemporary converging of the theoretical foundations of the KM capacity process dimension as suggested by Oliver (2003). The CISUS model was supported and validated by the study's findings, showing that it is useful for structured analysis and contemplation of the KM capacity process dimension, and thus forms a significant contribution to theoretical knowledge.

9.4.1.2 Four KM Capacity Dimensions

For the purposes of this study, four KM capacity dimensions were considered to contemplate a wholistic view of KM capacity, as was introduced in Chapters 2 and 3, within the limitations addressed in Section 4.13. The first dimension was the process dimension that incorporated the CISUS model discussed above. The human, technology and context dimensions were added to provide a four-dimensional perspective of KM capacity that became the conceptual framework of this study. As such, the KM capacity concept offered a theoretical contribution to the KM related literature to assist in the wholistic comprehension of contemporary KM. Furthermore, the notion that diversity within each KM dimension was shown to strengthen the overall team KM capacity though collaborative co-construction also introduced contributions to theoretical and practice-related contribution.

9.4.1.3 The KM Capacity – Capital Architecture

The KM capacity model described above, with its process, human, technology and context dimensions, can increase competitive advantage (Davenport & Prusak, 2000; Drucker, 1988, 1993; Kakabadse, Kakabadse, & Kouzmin, 2003; Nonaka, 1994), and generate forms of economic, cultural, and social capital (Gloet & Terziovski, 2004; Hermans & Kauranen, 2005; Subramaniam & Youndt, 2005) and vice versa (Luthans, Youssef, & Avolio, 2007).

In Chapter 3, a theoretical KM capacity–capital architecture was derived by merging the VW-M framework (Van Winkelen & McKenzie, 2011) with Bourdieu's (1986) forms of capital. My KM capacity–capital architecture (Matthews, 2015b) provided the structure utilised in the data collection and analysis stages, to distill the essential details to obtain a wholistic, insightful view of KM.

The RQ3 findings thus culminated in the empirical support of this theoretical KM capacity–capital architecture developed in Figure 3.5. The architecture was subsequently refined in Figure 8.2 to include an additional "other" form of capital intended to make the architecture more generalisable and helps to explain how and why a team constructs capacity, in another contribution to theory. Variations on this architecture were published during this PhD candidature (Matthews, 2014, 2015b), and the final Figure 8.2 KM capacity–capital architecture constituted a contribution to theoretical knowledge arising from this study relating to *how and why* KM capacity is constructed.

9.4.2 Contributions to Methodological Knowledge

This research also had methodological implications, through its qualitative, exploratory, case study method combined with descriptive profiling instruments to gather relevant data from which to draw new conclusions about the construction of KM capacity and forms of capital. In particular,

the application of the single site case study, the "string diagram" method of displaying the MBTI personality preference data and the profiling of participants across the four KM dimensions are considered contributions to methodological knowledge.

9.4.2.1 Case Study

The single site, exploratory (Babbie, 1989; Churchill, 1979; Kinnear & Taylor, 1996), ethnographic (Frankham & MacRae, 2011) case study (Iacono, Brown, & Holtham, 2011) approach was academically appropriate for this research (Day Ashley, 2012; Hillyard, 2010; Mills & Ratcliffe, 2012), and enabled the flexibility to adjust data collection sources so as to explore research insights further as I moved forward in the study. For example, the MBTI profile (Myers et al., 2003) of the team and organisation was added to triangulate with my ethnographic observations, and also exploration of the relationship with capital (RQ3) was formally added after my observations suggested this link. Therefore the emergent design of the ethnographic, exploratory, case study approach produced rigorous research that enabled deeper insights into the RQs through strategies such as triangulation, member checks, and thick descriptions (Yazan, 2015). Therefore, the contribution to methodological knowledge arises from the insights and value that the case study approach provided, further supporting future researchers in justifying a case study approach.

9.4.2.2 The MBTI Instrument

Methodological significance was offered through the research application of the MBTI Form M instrument (Myers et al., 2003) for insight into the human dimension of KM capacity in a university research team. The MBTI, as was detailed in Chapter 5, was appropriate to deploy in this academic team context (Fornaciari & Dean, 2013, Rycroft, 2012; Sangster, 2011) and provided insight into the RQ1 profiling of the human dimension of participants and team (Section

6.4), and the perceived MBTI influence of the team and organisation (Section 7.4) to enhance understanding of KM capacity (Quinn, 2005; Taylor, 2004). The development of this study's MBTI "string profile" method that enabled improved visualisation for comparative analysis of MBTI preference results along a dichotomous continuum in the team context. Thus, the application and analysis of the MBTI in these ways were noted as important contributions to methodological knowledge.

9.4.2.3 Other Data Collection Tools

Furthermore, the deployment of a combination of the data collection sources and tools used in this particular case study to cover wholistically all four KM capacity dimensions and three forms of capital offered some methodological significance. In particular, the combined application of the Wordle (Feinberg, 2010; Julien, Pecoskie, & Reed, 2011), Mandala (Bush,1988; Elkis-Abuhoff, Gaydos, Goldblatt, Chen, & Rose, 2009; Jung, 1965), survey tools (see Appendices K, L, and M), as well as the MBTI discussed above. This combination of data sources enabled triangulation of participants' KM capacity evidence and resulted in a novel methodology that helped inform the RQs as described in Chapter 5. Indeed, with the combination of the publication titles, wordle software, and a four-minute interview segment, significant insight was gained into the knowledge that Paul was processing (see Section 6.6.1.3). Similar combinations of data collection tools could be deployed in other research contexts to provide insight into KM capacity dynamics. Consequently, these tools offer a productive contribution to methodological knowledge.

9.4.3 Contributions to Practice-related Knowledge

The resulting KM capacity–capital architecture and the insight that diversity can assist KM capacity to be collaboratively co-construct are considered contributions to practice-related knowledge, informing the gap in understandings of KM as identified by Heisig et al. (2016).

9.4.3.1 The KM Capacity – Capital Architecture

In particular, the refined KM capacity–capital architecture as was discussed in Section 9.4.1 formed a contribution to practice-related knowledge, as the implications of this Figure 8.2 research contribution may have industry application and academic research relevance to individuals, teams and organisations in relation to wholistic comprehension of their construction of KM capacity and forms of economic, cultural and social capital.

As was stated in Section 8.7, the KM capacity-capital architecture presented a feasible intellectual bow for knowledge managers to draw, and a realistic bridge for industry knowledge workers to traverse practically, so as to help to address the elusive missing *how-why* link in KM comprehension that I hear being called for so insistently in the rigorous research results of Heisig et. al (2016).

9.4.3.2 The Inclusion of Diversity

This research highlighted how participants' KM capacities and practices were influenced by their MBTI personality preferences, resulting in one aspect of the team diversity. Also, by becoming more aware of their team MBTI diversity, the team members could adapt their own KM capacity to build on their natural strengths, implement strategies to assist in overcoming their weaknesses, and appreciate the other team members' strengths in constructing team harmony. In this way, rather than a "one key opens all KM locks" philosophy, this research suggested that KM

capacity can be collaboratively co-constructed by including the diversity of individual approaches and skills for a combined "KM toolbox". The practice-related implication of this finding for teams and organisations is that if the natural diversity within the human dimension is embraced and encouraged (Sangster, 2011), then high performing KM capacity can be achieved by the combination of diverse perspectives strengthening KM capacity-capital constructions.

9.5 Opportunities for Further Research Arising From this Study

Chapters 2 and 3 of this thesis reviewed the existing literature, which was extended in some aspects to present the KM capacity-capital architecture in Figure 3.5. Chapters 6, 7 and 8 utilised this KM architecture to analyse the study's data and to enable a wholistic view of the construction of KM capacity and the various forms of capital. In this way, the KM architecture assisted with comprehension of the whole metaphorical "KM elephant", and how and why it functions. In finalising my study, I reiterate that my study was limited by resources and scope, as was discussed in Section 4.7, and I acknowledge that further developments could be made to my thesis with regard to the construction of KM capacity and the forms of capital. Thus, some suggestions for possible further research opportunities are discussed separately below.

9.5.1 Constructing KM Capacity

Various other aspects could be explored within the four KM capacity dimensions, and these are highlighted below as further research points that could be pursued.

9.5.1.1 Additional Subdimensions

It is acknowledged that all of these KM capacity-capital findings could be further analysed, in greater granularity, through further study. Additional data collection tools could be deployed to

provide further granularity into the four KM dimensions and subdimensions to provide deeper, richer insight into KM capacity construction.

For example, the use of "creative zones and rates" in the process dimension could be further related to human dimensional personality preferences, with greater granularity to understand further how creative zones and rates" can influence the construction dynamics of KM capacity.

Also, in the context dimensions, additional theoretical constructs for context/environment analysis could be used, such as Porter's Five Forces (Porter, 2008), PESTEL analysis (Yüksel, 2012), blue ocean strategy (Kim & Mauborgne, 2004) or SWOT analysis (Hill & Westbrook, 1997; Jackson et al., 2003). These context analysis lenses and methods were considered too business-orientated for inclusion in my PhD, which is being examined in the education discipline. Similarly, there are a myriad of process, human and technology subdimensional tools and theories that could be incorporated, as was mentioned in the Chapter 2 literature review. Therefore, there are ample opportunities for future researchers to explore further the four KM capacity dimensions through analysing additional subdimensions.

9.5.1.2 Additional Case Study Site Contexts

Within the KM capacity context dimension, one limitation of this research was that it consisted of only a single site case study, focused on just the one unique team. Further research could use a similar method to explore other case study sites and teams in a variety of contexts, as the results and findings could reveal further insights into KM capacities and their relationship with various forms of capital. Similar studies in a current context would be useful to compare and contrast evolutions in constructing KM capacity arising since this 2010-12 study context. In particular, the combined theoretical, methodological and practice-related results could be compared and contrasted. For example, iteratively refining this study research design to be

deployed with a culturally different team may generate interesting reflections between the different cultural contexts and may simultaneously lead to some common maxims regarding KM capacity and capital philosophy.

9.5.1.3 Different Team Maturities

As a special case of the above point, I mentioned in Section 6.6 that the context of my study was focused on KM in a team that was in the performing stage of the team development their life cycle. Therefore, the KM capacity in this more mature team was maximised by the already established relationships and trusts that had been developed during the forming, norming, and storming stages (Tuckman, 1965). of which occurred prior to my study data collection. Indeed, this aspect of team trust was highlighted in the interviews, particularly by Kandy, as being a key value of the team and a factor enabling the team's KM capacity. Therefore, it could be a potential future research topic to study a similar, but newly formed team, that had not yet formed team relationships and trust, and to evaluate the KM capacity accordingly as the team progressed through the team development life cycle to the performing stage. This would enable greater comprehension of the KM capacity development with respect to team development.

9.5.2 KM and Forms of Capital

Further potential research opportunities are identified regarding the connection between KM capacity and capital in the following subsections.

9.5.2.1 Other Forms of Capital

This study focused only on the four KM dimensions and on three forms of Bourdieu's (1986) capital in order to draw an academic boundary around the study's scope, as was discussed in the Chapter 4 research design. I consider it academically prudent within this PhD to acknowledge that

there may well be additional KM dimensions and forms of capital present in the team that my study did not address. Thus, I included "other" forms of capital in Figure 8.2 to counter this potential criticism and to provide opportunity for further development by future researchers. Therefore, further research opportunity exists in exploring and developing the broader implications and relationships between KM capacity and the integration of these various "other" forms of capital in the interests of making the architecture more accurate and detailed.

9.5.2.2 Bourdieu's Other Ideas

Secondly, as was mentioned in Section 3.6.3, Bourdieu's body of work covered substantial intellectual ground, and he contributed many relevant theories and insights that could be considered to improve my KM-Capital conceptual framework, including notions of "habitus", "field", "competition" and "class" (Bourdieu, 1984, 1986; Bourdieu & Passeron, 1977; Bourdieu & Wacquant, 1992). These additional notions may assist comprehension of this wholistic KM topic; however, these notions were deemed beyond the scope of this PhD thesis owing to the time and word count limitations, and therefore this avenue exists for further research.

9.5.2.3 Capital Gain Evaluation

In Chapter 8, I provided evidence to show how this team applied the KM capacity of all members to produce outputs and outcomes that related to economic, cultural and social capital. However, it was beyond the scope of this study to quantify that capital gain, and to evaluate whether the capital gain results were worth the KM capacity efforts invested by each team member.

Furthermore, it was impossible to calculate and assess the total capital value of the team's knowledge products without the benefit of hindsight, and so there is the suggestion for a possible future review of this thesis in order to make that judgment. That is, in the medium-term future

some years hence, a research project could more accurately calculate the economic, cultural and social forms of capital generated by each team member as a result of their KM capacity outputs and outcomes constructed during this study period. The total capital value of the team's KM capacity can thus be retrospectively quantified and evaluated.

9.6 Post Data Collection Reflections

Further to the content of this thesis's analysis and discussion with reference to the team members' KM capacity and various forms of capital, it is appropriate to mention the post-data collection period, as it underlined the relevance of my study in the contemporary context of academic research teams.

After my study data collection had completed on 1 December 2012, the team still continued operations with an interest in constructing KM capacity and the various forms of capital. The team discussed ways to evolve and to become more competitive in attracting grant funding from the broader network level, and it was decided to expand team membership and to invite selected faculty academics to join the team. Consequently, this post-data collection period resulted in significant team structure and composition changes, with the team rapidly growing to 17 members, who boosted the team's KM capacity. However, these team changes influenced team dynamics, and in effect the nine-member team effectively completed a rapid adjourning stage and then a re-forming phase with the new team members' adjourning stage (Bonebright, 2010; Tuckman & Jensen, 1977).

The new team dynamics were substantially different, and these dynamics were also influenced by context dimension changes - for example staffing and policy changes at the university organisation level and also in the broader network level of Federal politics. There were

other changes at the network level, as personal relationships and specialist knowledge developed, and this also influenced the new team's KM capacity constructions.

While all team members boosted their cultural and social capital through their association with this expanded team, it was more difficult to manage practically the greater numbers and diversity. This revealed a hint that the smaller team of nine participants that I studied was big enough to benefit from the deeper diversity, yet small enough to bond and work together as one to achieve an objective or output, rather than splinter into a number of "subteams" working on different objectives or outputs.

Subsequently, the KM capacity relationship with economic capital as was found in this study was somewhat validated as when the "rivers of gold" (Robinson, 2018) that were mentioned in Section 8.5 dried up, the university restricted research funds. Starved of "startup" funds to invest in their KM capacity products, over the next two years the team dissolved, dispersing to progress other KM capacity activities where linkages with the various forms of capital were more available and attainable.

This post-data collection observation underlined how important it is to appreciate the contextual influences of the broader organisation and network on the team dynamics in order to understand KM capacity construction wholistically. Also it highlighted to me how the team's KM capacity that was constructed during the study data collection period continued to provide various forms of capital to the nine team members studied, as was discussed in Chapter 3, especially in the form of promotion and royalties (economic capital), as well as academic citations and networking (cultural and social capital). Therefore, whilst this post-data collection period is not discussed in detail, it is mentioned to highlight further the relevance of the Figure 8.2 KM capacity-

capital architecture and how a longitudinal study of a team KM capacity may be beneficial to understanding further this KM capacity-capital relationship.

9.7 The Biographically Situated Researcher Revisited

In addition to Chapter 1.6, some further points can be added when retrospectively considering my biographically situated research perspective. Firstly, I reflect on my dual role within the thesis study and secondly, on the influence of this PhD study on my professional development.

9.7.1 My Dual Role in the Team

My dual role during the course of this study, being both a member of the team and an ethnographic researcher embedded within it, has influenced my biographical situation. Firstly, this dual role enabled significant ethnographic insight to be included in this study to inform my wholistic understanding of the team's KM capacity, which may not have resulted from being in a "sole, visiting researcher role".

Secondly, if the PhD is an academic apprenticeship (Laudel & Gläser, 2008), then my inclusion in the research team provided the pleasure and experience of having worked with some "masters of the academic trade". In this way, my dual role within the research team placed me in a privileged position to obtain insights into the academic research profession as discussed in this thesis, and also into my professional development.

9.7.2 My Professional Development

My PhD experience has influenced me as a researcher, extending my knowledge of many topics, including KM capacity, forms of capital, and the academic research and publication

process. The ethnographic case study experience transferred academic knowledge and skills that are now embodied in my own research and KM construction philosophies. This thesis examination establishes a professional development milestone, and also compiles and cites insights from my previous publications and presentations in this one thesis document. A chronological timeline that assists to trace and reflect the thesis development process is included at Appendix M. My PhD professional development can now be applied to my future academic and consultancy opportunities, with the aim of generating future publications that add to the body of knowledge about this topic. Given the rapid rise of knowledge workers and the industry investment in KM capacity, my biographical situation within the wholistic KM discipline is likely to continue to further evolve in the future.

9.8 Conclusion

This final chapter recaps how this research sought to explore a specific gap in the literature regarding KM capacity, and how and why the relationship with Bourdieu's (1986) three forms of capital is important. It is considered that my resulting thesis has explored the gap explicitly and extensively, and that it has discussed the findings of the three RQs with respect to the literature relating to KM capacity and various forms of capital. In doing this, my thesis offers further understanding of and insight into the research problem, and contributes to the existing body of theoretical, methodological and practice-related knowledge. In conclusion, this thesis offers particular perspectives on and novel contributions to the developing KM scholarly field.

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APPENDICES

Appendix A: Definitions of Terms

Ambiminded	Like "ambidextrous", an adjective describing "able to use the right and left hands equally well, with origins from mid-17th century: from Latin ambi- 'on both sides' + dexter 'right-handed') + -ous (Oxford Dictionary, 2018). Similarly, in this thesis, "ambiminded" reflects fluency across the psychological MBTI dichotomy, and the ability to work in her or his non-preferred style equally well.
BOK	Body of knowledge
CISUS	A synthesis of the KM process dimension into its Create, Improve, Store, Use and Share process
Dimension	KM is considered to comprise four main dimensions (context, human, technology and process), with each dimension comprising various subdimensions. These dimensions encompass the broader places and spaces within the full systemic, wholistic scope of KM.
Diversity	A range or variety of responses

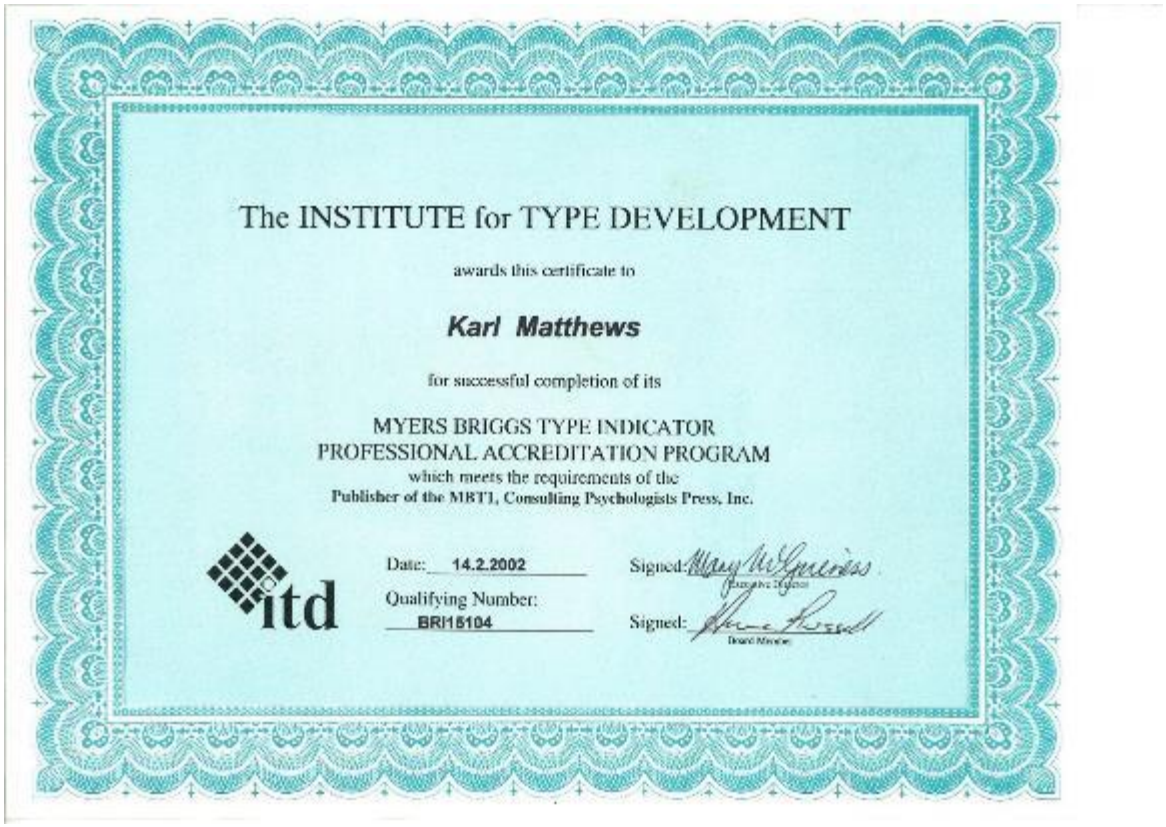
HMI	Human-machine interface
ICT	Information and Communication Technology, being the hardware, firmware and software that enable the digital tools within the technology dimension
IoT	Internet of Things. A term describing the interconnectedness of digital devices in the technology dimension
KM	Knowledge Management
KM capacity	Refers to the capacity that exists across all four KM process, human, technology and context dimensions
Participants	Refers to the individual team members. Primarily, each of the team members was a participant in this study and the data were analysed according to the participants' contexts
RQ	Research Question (refer Section 1.5)
Subdimension	Each of the four KM dimensions comprises various subdimensions, being subordinate aspects within the process, human, technology or context dimension

Wholistic	The term “wholistic” has been used, rather than “holistic”. The intent of this term is to depict a whole, overall view of the KM topic. “Wholistic” aligns with the term “university” being derived from the Latin “universitas”, meaning “universal” or “whole” (Moran, 2010).

Appendix B: MBTI Qualification Certification

Appendix B presents a scan of my MBTI qualification certificate BRI 15104 dated 14 February 2002, which was further confirmed by the then Principal and Director of the Institute for Type Development (ITD), Mary McGuiness (marymcg@itd.net.au), by email received on 24 September 2010, which stated:

> "In 1992 Karl Matthews successfully completed a Myers-Briggs Type Indicator (MBTI) Professional Qualifying Programme presented by our institute. This five-day training programme qualifies Karl to purchase, administer and interpret the results of the MBTI. Qualification Number: BRI 15104. This qualification is recognised by CPP, the publisher of the MBTI, based in Palo Alto, California."



The INSTITUTE for TYPE DEVELOPMENT

awards this certificate to

Karl Matthews

for successful completion of its

MYERS BRIGGS TYPE INDICATOR
PROFESSIONAL ACCREDITATION PROGRAM
which meets the requirements of the
Publisher of the MBTI, Consulting Psychologists Press, Inc.

itd

Date: 14.2.2002

Qualifying Number: BRI15104

Signed:

Signed:

Appendix C: Ethics Approval to 1 July 2012

The initial ethics approval letter (H10REA216) was provided in the letter below:

TOOWOOMBA QUEENSLAND 4350
AUSTRALIA
TELEPHONE +61 7 4631 2300

CRICOS: QLD 00244B NSW 02225M

www.usq.edu.au

OFFICE OF RESEARCH AND HIGHER DEGREES
William Farmer
Ethics Officer
PHONE (07) 4631 2690 | FAX (07) 4631 1995
EMAIL ethics@usq.edu.au

4 November 2010

Karl Matthews
Faculty of Education
USQ Toowoomba Campus

Dear Karl

The Chair of the USQ Fast Track Human Research Ethics Committee (FTHREC) recently reviewed your responses to the FTHREC's conditions placed upon the ethical approval for the below project. Your proposal now meets the requirements of the *National Statement on Ethical Conduct in Human Research (2007)* and full ethics approval has been granted.

Project Title	A Case Study of Knowledge Management Practice
Approval no.	H10REA216
Expiry date	01/07/2012
FTHREC Decision	**Approved**

The standard conditions of this approval are:

(a) conduct the project strictly in accordance with the proposal submitted and granted ethics approval, including any amendments made to the proposal required by the HREC
(b) advise (email: ethics@usq.edu.au) immediately of any complaints or other issues in relation to the project which may warrant review of the ethical approval of the project
(c) make submission for approval of amendments to the approved project before implementing such changes
(d) provide a 'progress report' for every year of approval
(e) provide a 'final report' when the project is complete
(f) advise in writing if the project has been discontinued.

For (c) to (e) forms are available on the USQ ethics website: http://www.usq.edu.au/research/ethicsbio/human

Please note that failure to comply with the conditions of approval and the *National Statement (2007)* may result in withdrawal of approval for the project.

You may now commence your project. I wish you all the best for the conduct of the project.

William Farmer
Ethics Officer
Office of Research and Higher Degrees

Appendix D: Ethics Extension to 1 December 2012

An extension of the ethics approval (H10REA216.1) was provided in an email received 15 June 2012 stating:

Dear Karl

The Ethics Chair has recently reviewed your application for amendments to approved project A case study on Knowledge Management Practice H10REA216 as stated in your memorandum dated. The requested amendments have been endorsed and full ethics approval has been granted.

Your amendment approval number is H10REA216.1

Ethics approval for the project expires on 01.12.2012.

The standard conditions of this approval are:

(a) conduct the project strictly in accordance with the proposal submitted and granted ethics approval, including any amendments made to the proposal required by the HREC
(b) advise (email: ethics@usq.edu.au) immediately of any complaints or other issues in relation to the project which may warrant review of the ethical approval of the project
(c) make submission for approval of amendments to the approved project before implementing such changes
(d) provide a 'progress report' for every year of approval
(e) provide a 'final report' when the project is complete
(f) advise in writing if the project has been discontinued.

For (c) to (e) proformas are available on the USQ ethics website: http://www.usq.edu.au/research/ethicsbio/human

Please note that failure to comply with the conditions of approval and the National Statement on Ethical Conduct in Human Research (2007) may result in withdrawal of approval for the project.

You may now implement the amendments. I wish you all the best for the conduct of the project.

Kind regards

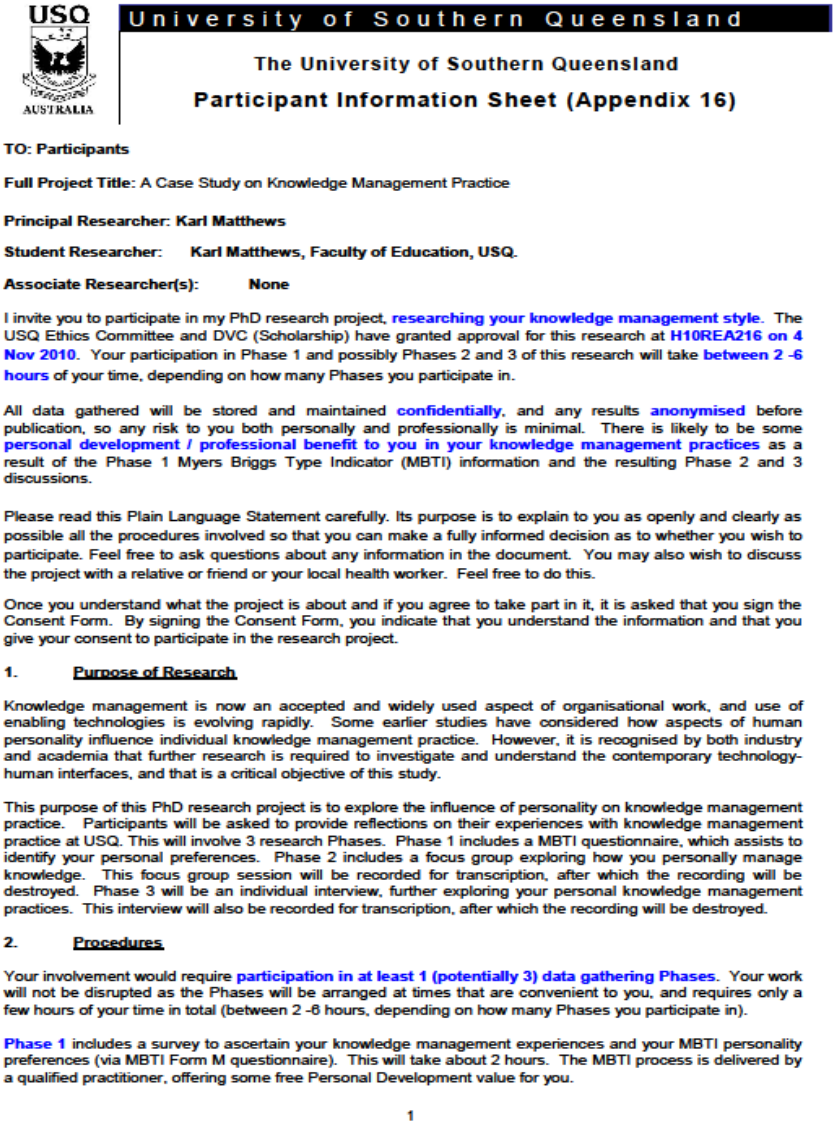
Melissa McKain

Ethics Committee Support Officer, Office of Research & Higher Degrees

USQ, Toowoomba Campus, Ph + 61 7 46312690 | Email melissa.mckain@usq.edu.au

Appendix E: Participant Information Sheet

All participants provided their informed consent prior to data collection via the following information sheet:



University of Southern Queensland

The University of Southern Queensland

Participant Information Sheet (Appendix 16)

TO: Participants

Full Project Title: A Case Study on Knowledge Management Practice

Principal Researcher: Karl Matthews

Student Researcher: **Karl Matthews, Faculty of Education, USQ.**

Associate Researcher(s): **None**

I invite you to participate in my PhD research project, **researching your knowledge management style**. The USQ Ethics Committee and DVC (Scholarship) have granted approval for this research at **H10REA216 on 4 Nov 2010**. Your participation in Phase 1 and possibly Phases 2 and 3 of this research will take **between 2 -6 hours** of your time, depending on how many Phases you participate in.

All data gathered will be stored and maintained **confidentially**, and any results **anonymised** before publication, so any risk to you both personally and professionally is minimal. There is likely to be some **personal development / professional benefit to you in your knowledge management practices** as a result of the Phase 1 Myers Briggs Type Indicator (MBTI) information and the resulting Phase 2 and 3 discussions.

Please read this Plain Language Statement carefully. Its purpose is to explain to you as openly and clearly as possible all the procedures involved so that you can make a fully informed decision as to whether you wish to participate. Feel free to ask questions about any information in the document. You may also wish to discuss the project with a relative or friend or your local health worker. Feel free to do this.

Once you understand what the project is about and if you agree to take part in it, it is asked that you sign the Consent Form. By signing the Consent Form, you indicate that you understand the information and that you give your consent to participate in the research project.

1. Purpose of Research

Knowledge management is now an accepted and widely used aspect of organisational work, and use of enabling technologies is evolving rapidly. Some earlier studies have considered how aspects of human personality influence individual knowledge management practice. However, it is recognised by both industry and academia that further research is required to investigate and understand the contemporary technology-human interfaces, and that is a critical objective of this study.

This purpose of this PhD research project is to explore the influence of personality on knowledge management practice. Participants will be asked to provide reflections on their experiences with knowledge management practice at USQ. This will involve 3 research Phases. Phase 1 includes a MBTI questionnaire, which assists to identify your personal preferences. Phase 2 includes a focus group exploring how you personally manage knowledge. This focus group session will be recorded for transcription, after which the recording will be destroyed. Phase 3 will be an individual interview, further exploring your personal knowledge management practices. This interview will also be recorded for transcription, after which the recording will be destroyed.

2. Procedures

Your involvement would require **participation in at least 1 (potentially 3) data gathering Phases**. Your work will not be disrupted as the Phases will be arranged at times that are convenient to you, and requires only a few hours of your time in total (between 2 -6 hours, depending on how many Phases you participate in).

Phase 1 includes a survey to ascertain your knowledge management experiences and your MBTI personality preferences (via MBTI Form M questionnaire). This will take about 2 hours. The MBTI process is delivered by a qualified practitioner, offering some free Personal Development value for you.

1

Phase 2. Based on the results of Phase 1, you may be invited to take part in a Focus Group (Phase 2). It is anticipated that not all Phase 1 participants will need to become involved in Phase 2. Phase 2 Focus Groups will take about 2 hours, and include discussions on your knowledge management practice.

Phase 3. Based on the results of Phase 2, you may be invited to take part in an Interview (Phase 3). It is anticipated that not all Phase 2 participants will be involved in Phase 3. Phase 3 will further explore Phase 2 knowledge management issues in a 2 hour face-face interview.

All data gathered will be stored and maintained confidentially, and any results anonymised before publication, so any risk to you both personally and professionally is minimal. There is likely to be some personal development / professional benefit to you in developing your knowledge management practices as a result of the Phase 1 MBTI information and the resulting Phase 2 and 3 discussions.

3. Confidentiality

You and all other participants will remain anonymous in the doctoral dissertation to which this research project relates and in future publications and presentations based on the project. Data will be stored securely to protect all participants' anonymity and confidentiality.

During Phase 1 of the research, the names of participants will be identified in data collected; however this will be maintained as confidential during data collection; stored in locked filing cabinets and in encrypted, password protected hard-drives. Confidentiality of focus group discussions cannot be guaranteed beyond this researcher, however, focus group members will be asked to respect the confidentiality of other members of the group. As the study results become publishable in the final stages, participant identities will be removed and replaced with pseudonyms (i.e. 1A, 2B, 3C etc), so that all participants will remain anonymous in the dissertation and future publications and presentations, and no participant will be individually identified.

Both audio and video recordings will be used to record the participants' engagement during the data gathering process, for review and analysis by the researcher at a later time for any significant events, and these recordings will be transcribed by the researcher. The recordings will be kept on an encrypted and password protected hard-drive until the end of the researcher's period of PhD study and then will be erased and destroyed, with only the anonymised transcriptions remaining as the data set for 5 years.

4. Voluntary Participation

Participation is entirely voluntary. **If you do not wish to take part you are not obliged to.** If you decide to take part and later change your mind, you are free to withdraw from the project at any stage. Any information already obtained from you will be destroyed. However, any focus group data will not be possible to withdraw completely. Your decision whether to take part, not to take part, or to take part and then withdraw, will not affect your relationship with the University of Southern Queensland or the researcher. If you do wish to withdraw from this research at any time, please notify the researcher.

Before you make your decision, the researcher is available to answer any questions you have about this research project. You can ask for any information you want. Sign the Consent Form only after you have had a chance to ask your questions and have received satisfactory answers.

5. Queries or Concerns

Should you have any queries regarding the progress or conduct of this research, you can contact the principal researcher, Karl Matthews, at the Faculty of Education on x5401, or at Karl.Matthews2@usq.edu.au.

If you have any ethical concerns with how the research is being conducted or any queries about your rights as a participant please feel free to contact the University of Southern Queensland Ethics Officer on the following details: ***Ethics and Research Integrity Officer, Office of Research and Higher Degrees, University of Southern Queensland, West Street, Toowoomba 4350,*** **Ph: +61 7 4631 2690, Email:** ***ethics@usq.edu.au***

Appendix F: Participant Consent Form

All participants signed the consent form below:

University of Southern Queensland

The University of Southern Queensland

Consent Form (Appendix 17)

TO: Participants

Full Project Title: A Case Study on Knowledge Management Practice

Principal Researcher: Karl Matthews

Student Researcher: **Karl Matthews**

Associate Researcher(s): **None**

- I have read the Participant Information Sheet and the nature and purpose of the research project has been explained to me. I understand and agree to take part.
- I understand the purpose of the research project and my involvement in it.
- I understand that I may withdraw from the research project at any stage and that this will not affect my status now or in the future.
- I confirm that I am over 18 years of age.
- I understand that I will be audiotaped / videotaped / photographed during the study.
- I understand that the audio and video files will be digitally stored on an encrypted, password protected drive, in a locked cabinet, whilst transcribing the audio/video files into text. Only the researcher and research assistant will have access to the audio/video file. Once transcribed, all copies of the audio/video file will be deleted.
- I understand that while information gained during the study may be published, I will not be personally identified and my personal results will remain confidential.

Name of participant.....

Signed.....**Date**.....

If you have any ethical concerns with how the research is being conducted or any queries about your rights as a participant please feel free to contact the University of Southern Queensland Ethics Officer on the following details.

Ethics and Research Integrity Officer
Office of Research and Higher Degrees
University of Southern Queensland
West Street, Toowoomba 4350
Ph: +61 7 4631 2690
Email: *ethics@usq.edu.au*

Appendix G: Ethics Forms: Dates Signed

Pseudonym (Code)	**Consent to Participate in Study: Date Signed**	**Consent to Share Data within Team: Date Signed**
Lucy (L)	9 December 2010	24 January 2011
Emma (E)	20 December 2010	20 January 2011
Paul (P)	9 December 2010	10 January 2011
Wal (W)	9 December 2010	24 January 2011
Owen (O)	9 December 2010	22 January 2011
Ruby (R)	19 January 2011	20 January 2011
Marge (M)	9 December 2010	23 January 2011
Kandy (K)	19 January 2011	19 January 2011
Dave (D)	9 December 2010	24 January 2011

Appendix H: Participant Consent to Share Study Data Within Team

An additional consent form to approve the sharing of study data within the team was developed for this study, as appears below:

Consent / Permission to Share MBTI and KM Results, and Video Record Sessions.

I hereby grant permission for Karl Matthews (the researcher) to share my Myers Briggs Type Indicator (MBTI) type preference results, and my Knowledge Management (KM) survey results with the other participants of this PhD research. This **sharing of personal information with other participants** serves to enhance inter-participant discussions on the various different preferences existing, which greatly increases the depth and richness of research data gathered. The information sharing may also facilitate team-building of the team by increasing each members' self-awareness and understanding of other members personal and professional work preferences.

I also permit the researcher to **audio and/or video record** the MBTI and KM survey process, and the follow up focus groups and interviews. This will include video of the team planning day scheduled for 24 Jan 11. The researcher will advise participants when the audio / video recording is about to start / stop so the participants will be fully aware when a data gathering recording is underway. The USQ ethics clearance granted for this research project permits audio/video recording.

I understand that the resulting survey / audio / video data will be stored confidentially, and in all published results, data will be anonymised in accordance with ethics clearance requirements.

Name _____

Signed _____

Date _____

Appendix I: The Interview Dates

Interviews with participants were conducted on the following dates:

Interview	Pseudonym	Interview date
1	Lucy	23 June 2011
2	Marge	29 June 2011
3	Owen	5 July 2011
4	Wal	7 July 2011
5	Paul	10 August 2011
6	Emma	21 September 2011
7	Kandy	13 October 2011
8	Ruby	27 October 2011
9	Dave	28 October 2011

Appendix J: Semi-Structured Interviews: Indicative Questions

The focus of this research is to explore your KM capacity in the context of the research team. Each session will take approximately 1 hour and will be audio recorded for transcription. The following list of topic categories and questions serve to guide the interview only in a general sense. The intent of the question structure is to explore how the participants construct KM capacity and forms of capital, which can then be analysed with respect to all other data about their process, human, technology and context dimensions. Participants are encouraged and enabled to digress, elaborate or even direct the course of the session. Questions may evolve from session to session as insights, concepts and themes emerge.

Interview Exploring KM Capacity Dimensions and Forms of Capital

Process Dimension: Knowledge, beliefs and work practices

- This is your publication "Wordle" – does it reflect your KM focus?
- Discussion of CISUS processes to triangulate with CISUS survey data
- Discuss how you create, improve, store, use and share knowledge.
    - What is your work practice/philosophy?
    - Is your KM practice structured?
    - How does your research benefit the individual/group/organisation?
    - How do you communicate your knowledge, and whom do you work with?

Human Dimension: Knowledge, beliefs and work practices

- Questions to confirm participant MBTI Preference.
- How does your MBTI preference influence your knowledge management practice?

- Discussion, clarification and confirmation of demographic data from survey.

Technology Dimension: Knowledge, beliefs and work practices

- Discuss the ways you use technology to manage your knowledge.
- Obtain permission to take a photograph of the participant's office
- Discussion, clarification and confirmation of data from technology survey.
- Further discuss how participants manage knowledge with ICT tools, for knowledge creation, improvement, storage, use and sharing.

Context Dimension: You in the team

- Clarify the Mandala self-interpretation "you in the team" for knowledge network analysis. Focus on how the Mandala reveals team context issues.
- Discuss views of the university knowledge resources and plans.

Relationship with forms of capital: Knowledge, beliefs and work practices

- How do you engage with the forms of capital – economic, cultural and social?
    - How does your KM relate to economic capital?
    - How does your KM relate to cultural capital?
    - How does your KM relate to social capital?
    - How does your knowledge work enable the university's competitive advantage?
- Is there anything else you would like to add or mention in relation to your KM capacity or capital?

Appendix K: CISUS Survey

Participants completed the following survey:

Survey Part 2. Frequency of Knowledge Management Practices

This survey explores the frequency of your Knowledge Management practices, both personally and within the Research Team. Place an X in the column that, ON AVERAGE, reflects the frequency of your knowledge practices during 2011

	In 2011,	Quarter (3	Month	Week	Day	Hour
2.1	I *Created** some knowledge for *My Personal* benefit, every:					
2.2	I *Created* some knowledge for *Research Team* benefit, every:					
2.3	I *Improved** some knowledge for *My Personal* benefit, every:					
2.4	I *Improved* some knowledge for *Research Team* benefit, every:					
2.5	I *Stored** some knowledge for *My Personal* benefit, every:					
2.6	I *Stored* some knowledge for *Research Team* benefit, every:					
2.7	I *Used** some knowledge for *My Personal* benefit, every:					
2.8	I *Used* some knowledge for *Research Team* benefit, every:					
2.9	I *Shared** some knowledge for *My Personal* benefit, every:					
2.10	I *Shared* some knowledge for *Research Team* benefit, every:					

The survey footnotes * defined the CISUS terms as follows:

Creating knowledge means that you bring into existence some new realisation, process or product. Examples are any copyrightable concepts, ideas, written documents, tools or works of art.

Improving knowledge refers to you refining or making better some existing knowledge, either through critique, amendment, alteration or addition. Significant improvements could be considered creation of knowledge.

Storing knowledge is the practice or filing, cataloguing or archiving your knowledge assets for potential future access, use, improvement and reference.

Use of knowledge is the application of your theoretical and practical understanding and/or information by either you or another party.

Sharing your knowledge is the process of apportioning or distributing your knowledge among others, either face-face or through electronic medium.

Appendix L: Demographic Survey

Participants completed the following survey:

This descriptive survey explores your demographic profile and aspects of KM within the team context.

This survey aims to profile Research Team membership.	
Given Name:	
Surname:	
Gender	
Age in 2011 (see calc below)	
Country of Birth	
Countries where your childhood (0-10yrs) was spent	
Main languages used in 2011	
Other languages spoken/written	
Main Employer in mid 2011	
Role at Uni in year 2011	
Years you have been involved with study site uni	
Highest Degree awarded (prior to 2012)	
(Optional*) Religious faith you identified with in 2011	
(Optional*) Ethnicity	
* These optional questions assist to position participants within global cultural context	

Appendix M: Technology Survey

Participants completed the following survey to gather descriptive data about the technology dimension skill and use:

This survey explores your Knowledge Management (KM) technology dimension skill and use, including Information Communication Technology (ICT) usage and expertise.

Type a number in the green columns to indicate your technology usage hours (approximate). Type a 1 in the applicable blue columns to indicate your level of expertise. Type a % amount figure in the orange column indicating your planned change in usage, if any. Type a % figure in the beige columns indicating your use of technology for various purposes.

For the following technologies:	**How much do you use it? (on average)**			**Level of expertise**					**Plan to change usage (over next year) by ?%?**	**% used for team, work and private purposes (approximate)**		
	Never even heard of it!	**Heard of it, but never use it**	**Write # minutes used/week**	**No Experience**	**Beginner**	**Intermediate**	**Advanced**	**Expert/Trainer**	**i.e. 10+ (for 10% increase), 0 (if no change in use), or 30- (decrease in use) etc.**	**Research team use %**	**Private/ personal use %**	**Other professional work use %**
Example of how to answer. Write response into your selected response column, e.g., **Desk lamp**			420				1		10+	10	40	50

Hardware Peripherals

Mobile device for voice communications (e.g., cell/mobile phone)											
Mobile device for text communications (e.g., SMS phone/iPad)											
Voice recorder											
Camera (for still shots)											
Camera (for video footage)											
Printer											
Photocopier											
Scanner											
Fax											
Television (including free and pay TV)											
External hard-drives (e.g., USB drives)											
Connecting light projector to PC for display of screen onto wall											

GPS navigator (e.g., car Nav-man)												

ICT System Setup and Maintenance

Virus protection												
File backups												
Compression (e.g., WinZip)												
Installing programs												
Un-installing programs												
Defrag and scandisk												
Reinstallation for disaster recovery (e.g. Ghost)												

Applications

Word processing (e.g., creating, storing electronic text with MS Word)												
Email (e.g., sending and receiving electronic messages with MS Outlook)												

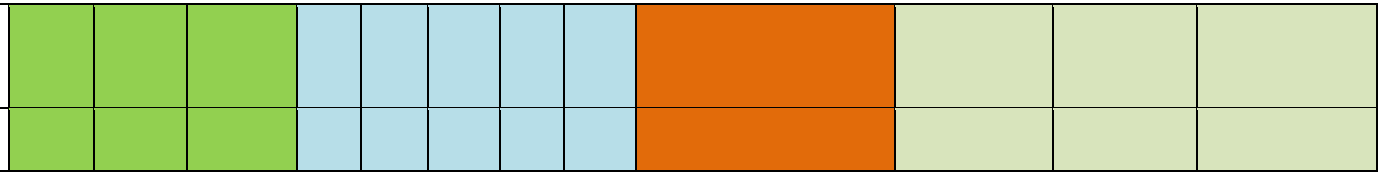
Music listening (e.g., via your PC, phone, iPod or other ICT device												
Video watching (e.g., on your PC, phone, iPod or other ICT device												
Spreadsheets (manipulating /organising numbers, e.g., with MS Excel)												
Internet (browsing, searching, downloading e.g., with MS Explorer)												
Calendar/diary (e.g., Outlook)												
Bibliographic software (e.g., Endnote)												
Graphics (for storing/manipulating pictures, diagrams, graphs or symbols, e.g., Photoshop)												
Movie maker applications												

Presentation software (e.g. MS PowerPoint)												
Website design (e.g., Dreamweaver)												
Database use and design												
Analysis software (e.g. NVivo or SPSS)												
Animation applications												
Accounting applications												
Project management tools												
Programming to design own apps												

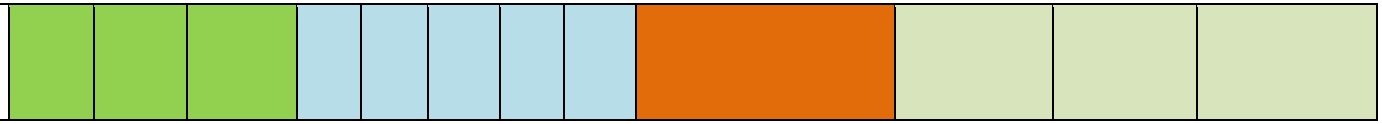
Web/Network Capabilities

Desktop networked connection to access files/internet (e.g., LAN)												
Remote login to network												

Web-portal use												
Mobile device for wireless internet access (e.g., iPad, smart-phone)												
RSS feeds to your accounts												
Mapping (e.g., google maps)												
Devices connected via Bluetooth												
Social networking sites (e.g. Facebook, Twitter, LinkedIn, YouTube)												
Cloud computing (e.g., storing files in Dropbox)												
Adding content into SharePoint intranet												
Online banking												
Online chat (e.g. Skype)												
Video conferencing												
Upload a podcast												
Uploading to blogs												
Uploading to wikis												

Network administration (server)	
Network design	

Other ICT use?

Other computer technology use? _____	

Appendix N: Chronology of PhD Thesis Development

This appendix provides a timeline of my PhD study completion, to summarise the progression of thesis development within my PhD candidature enrolment. It was considered that this timeline of completion was useful for future reference, given the extended nature of this PhD development process, with its multiple leave breaks and part-time enrolment periods.

Date (Semester)	PhD Activity
S2, 2009	Full time enrolment Commence PhD candidature 20 July 2009. Literature review and research proposal development.
S1, 2010	Full time enrolment Review of literature. Develop Research Proposal. Ethics clearance developed.
S2, 2010	Full time enrolment Proposal presented to Confirmation Panel. Ethics clearance obtained (4 November 2010). Invite participants for data collection. Commence data collection, and analysis. Conduct all MBTI assessments. 24 Jan 11 – Team focus group on MBTI results Continue writing for academic publications.
S1, 2011	Full time enrolment Proposal revised based on Confirmation Panel's feedback. Invite participants for further data collection. Continue data collection, and analysis. Commence thesis writing. Continue writing for academic publications.
S2, 2011	Full time enrolment Continue data collection. Continue data analysis to answer research questions. Continue Thesis write-up. Continue writing for academic publications. Confirmation of candidature on 8 September 2011.
S1, 2012	Leave – Full time consulting.

	Continue writing for academic publications.
S2, 2012	Full time enrolment 12Apr12 Team Focus Group 3 – MBTI and Mandala Complete data collection (on 1 December 2012). Continue data analysis to answer research questions. Continue Thesis write-up. Continue writing for academic publications.
S1, 2013	Leave – full time consulting. Continue writing for academic publications.
S2, 2013	Part time enrolment Continue data analysis to answer research questions. Continue Thesis write-up. Continue writing for academic publications.
S1, 2014	Part time enrolment Continue data analysis to answer research questions. Continue Thesis write-up. Continue developments for academic publications.
S2, 2014	Part time enrolment Continue Thesis write-up. Continue developments for academic publications.
S1, 2015	Leave – full time consulting.
S2, 2015	Leave – full time consulting.
S1, 2016	Part time enrolment Continue Thesis write-up.
S2, 2016	Part time enrolment Continue Thesis write-up.
S1, 2017	Leave – full time consulting.
S2, 2017	Part time enrolment Prepare Thesis for examination.
S1, 2018	Part time enrolment Finalise Thesis for examination. Submit Thesis for examination.
S2, 2018	Thesis under examination, no enrolment required. Incorporate Examiner revisions and complete
S1, 2019	PhD Graduation