

How do Project Managers  
Acquire and Exchange Knowledge?  
An Action Research Study  
of Project Managers in Australia.

by

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*'Knowledge is of no value unless you put it into practice.'*

Anton Chekhov, Russian physician and playwright (1860-1904)



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## Glossary of Terms

Term	Explanation
Action Research	'... a flexible spiral process which allows action (change, improvement) and research (understanding, knowledge) to be achieved at the same time. The understanding allows more informed change and at the same time is informed by that change. People affected by the change are usually involved in the action research. This allows the understanding to be widely shared and the change to be pursued with commitment' (Dick 2002a, p. 1).
<i>ad hoc</i>	'... 2. Impromptu; an ad hoc decision is one made with regard to the exigencies of the moment' (The Macquarie Dictionary 2009, p. 19)
Cognitive apprenticeship	An experiential learning cycle linking an abstract concept to an active experiment, thus providing a concrete experience and then an opportunity to reflect (Kolb 1984).
Constructive disruption	Overt behaviour to identify if all work details are being managed, and all options investigated.
Education	'The act or process of educating; the imparting or acquisition of knowledge, skill, etc.' (The Macquarie Dictionary 2009, p. 533).
Experience	'Knowledge or practical wisdom gained from what one has observed, encountered, or undergone' (The Macquarie Dictionary 2009, p. 583).
External Reference Group	An experienced and senior group of academics and project management leaders who generate additional insights, and enhanced the quality of research to guide the researcher through the advance of the action research through multiple cycles.
<i>in situ</i> observations	Observations captured by the researcher of the research participants in their usual place of work. Researcher observations were of research participants' daily activity including interactions with others in the workplace.
Knowledge	A fluid mix of framed experience, values, contextual information and expert insight to provide a framework for evaluating and incorporating new experiences and information (Davenport & Prusak 1998).

Term	Explanation
Knowledge Acquisition	Occurs when information or ideas from other people are accessed, captured, processed and retained, adding to an individual's tacit knowledge.
Knowledge Drivers	Knowledge intensive culture in the form of a process involving transaction between the person and the environment through personality, motivation, behaviour, learning, skills, and competencies.
Knowledge Environment	The environment in which the research participants worked where the individual '... influences and is influenced by the environment ... with which he or she interacts' (see Nonaka, Toyama and Konno 2000, p.8).
Knowledge Exchange	Knowledge exchange is a social process contingent on histories, professional perspectives and local conditions where interaction results in a systematic mutual approach to identify, capture and share tacit knowledge in order for it to become explicit knowledge.
Knowledge Exchange Instrument	Tool used by the research participants to consistently implement the exchange of knowledge in various situations in five key areas: organisation; individuals; relationship; tools; and project.
Knowledge Management	'... the application of principles and processes designed to make relevant knowledge available to the project team' (Reich 2007, p. 8).
Knowledge Sharing	Factors affecting knowledge sharing in organizations, such as organizational culture, trust, incentives, and technology. Explicit knowledge sharing occurs when explicit knowledge is made available to be shared between entities. Tacit knowledge sharing occurs through different types of socialisation.
Knowledge Sources	The artefacts used to exchange knowledge, such as databases, internships, coaching, mentoring, personal knowledge, reflection, communities of practice, and storytelling.
Knowledge Transfer	To transfer knowledge from one part of the organization to another. It is complex as much of it is tacit and resides in organizational members, tools, tasks, and networks.
Literature Clusters	Specific ideas relating to the research which are grouped under four central themes explored in the literature which link back to the research concerns.
PMBOK® Guide	Project Management Body of Knowledge.

Term	Explanation
Project	A temporary, unique endeavour to deliver a change. A project is not routine or repetitive (Larson & Gray 2011, p. 6), and is not a group of related projects identified as a program (Project Management Institute 2013, p. 4). A project is managed in most industries and disciplines within a project life cycle which describes a period of time when a project is initiated, planned, executed, and closed.
Project Environment	The environment in which the project manager may acquire and exchange knowledge.
Project Knowledge	A skill required for project managers to deliver their projects against agreed objectives by acquiring, constructing, and exchanging knowledge.
Project Management	The application of knowledge, skills, tools, and techniques to project activities to meet project requirements (Project Management Institute 2013, p. 5) within a specified period of time.
Project Management Competencies	Defined criteria of project management competency in terms of standards and bodies of knowledge used to assess if a person is competent, qualified and capable.
Project Management Context	Includes relevant definitions and methodologies underpinning the management of projects in Australia, including education and assessing the competency of a project manager, Australian project management training and education, and industry association driven competency assessments in Australia.
Project Manager	The person assigned by the performing organisation to lead the team which is responsible for achieving the project objectives and will '... plan, schedule, motivate, and control' (Larson & Gray 2011, p. 10) a finite piece of work in an ever evolving environment.
Research Informant	Research participant as the subject of the research.
Research Participant	One of six experienced Australian project managers. 'Social actors' in their organisation, their project(s) and within the project management community.



Term	Explanation
Research Partner	Research participants' secondary role in the progress of the research where the research participant engaged in collaborative discussion and collective exchange of knowledge with a sense of belonging to a community that had undergone a unique experience.
Storytelling	'Storytelling is probably the oldest art form, [where] people think in terms of metaphors and learn through stories' (Martin 2000, p. 10).
Training	'The development in oneself or another of certain skills, habits and attitudes' (The Macquarie Dictionary 2009, p. 1746).
Work Colleague	Colleagues of the research participant working in the same organisation and are familiar with the research participant.

## List of Abbreviations

Abbreviation	Expansion/Explanation
AIPM	Australian Institute of Project Management
CoP	Community of Practice
DIKW	Data, Information, Knowledge, Wisdom Model
DOD	US Department of Defense
ERG	External Reference Group
FMA	Framework, Methodology and Action Model
LFA	Logical Framework Approach
NATO	North Atlantic Treaty Organization
NSW	New South Wales
PALS	Parallel Action Learning Structures
PMI	Project Management Institute
PMBOK®	Project Management Body of Knowledge
PMOs	Project Management Offices
PMIS	Project Management Information System
PRAR	Problem Resolving Action Research Model
RC	Research Claim
RCC	Research Counter Claim
SET	Social Exchange Theory
SNA	Social Network Analysis
ToA	Theory of Action
ToRA	Theory of Reasoned Action

## Abstract

This research study is based on a concern in the project management community, and Australian industry in general, about intergenerational loss of project management knowledge because of a talent exodus, resulting in a loss of capability within organisations. The results of an investigation conducted to understand how knowledge is acquired and exchanged in the delivery of projects in Australia by project managers are presented in this thesis. Two primary research questions were formed for this investigation: 1. How do project managers *acquire* project management knowledge?; and 2. How do project managers *exchange* project management knowledge? A secondary research question was developed to identify the knowledge sources which project managers use to acquire and exchange project management knowledge. The research also aims to demonstrate how a project manager's personal behaviour, and the environment, influence how they acquire and exchange knowledge.

An approach was required to separate what transpired during the acquisition and exchange of knowledge from the act of managing projects. The experiential approach is also used to examine the rhetoric of project managers, compared to observing actual behaviour. In the context of being situated in the workplace, conducting the investigation using an interpretivist research paradigm allowed themes to emerge and contribute to theory.

A review of contemporary project management literature and practice resulted in a research framework based on a review of project management training, education and competency, and the areas underpinning knowledge acquisition and exchange. To structure this approach, four clusters were constructed to allow for interpretation covering knowledge acquisition; knowledge exchange; knowledge environment; and knowledge drivers. As the research evolved, emerging information and related topics to address the research questions, could be accommodated within these clusters.

To accommodate the research paradigm an action research methodology was selected for the study, which involved iterative cycles of interaction and reflection to examine the project manager's situation. Within these cycles, changes were made in order to evaluate how project managers could exchange knowledge more effectively. Several spin-off cycles were also employed to generate timely input from an external reference group to augment the rigour of the investigation. To identify research participant led, themes a systematic process was designed to collect, transcribe, and analyse the data, while recording the researcher's reflections

for interpretation. The themes relating to how project managers acquire and exchange knowledge were compared to the literature to identify divergence or convergence, and compare theories of social exchange, action, and reasoned action.

The evidence from the research indicates experienced project managers in Australia acquire knowledge primarily from workplace experiences and interaction with, and guidance from, work colleagues. Further, project managers in the study were observed using formal ways to exchange knowledge and did so in an impersonal manner. However, in the exchange of knowledge, inconsistencies existed between project managers' observed behaviour, opinions of their work colleagues, and the project managers' view of themselves, indicating different perspectives of practice.

Findings from the research contribute to social, action, and reasoned action theory relating to project management, with opportunities to apply the action research methodology to project management research, and to embed knowledge acquisition and exchange in project management policy. The research advances the practice of project management by establishing how knowledge is exchanged at project manager level.

# Publications Arising during the Research

## Research Award

IPMA-PMI 2013 Best Student Paper Prize for 'Designing Research to Understand Knowledge Exchange among Project Managers', *International Research Network on Organising by Projects (IRNOP) XI Project Research Conference*, Oslo, Norway.

## Refereed Journals

Algeo, C. 2014, 'Exploring Project Knowledge Acquisition and Exchange through Action Research', *Project Management Journal*, vol. 45, no. 3, pp. 1-11.

## Refereed Book Chapters

Algeo, C. in print, 'Action Research in a Project Environment', in D. Coghlan & M. Brydon-Miller (eds), *Action Research in a Project Environment, Action Research Encyclopedia*, Sage, Thousand Oaks, CA, USA, pp. 1-9.

## Refereed Conference Papers

Algeo, C. 2014, 'Developing Professional Project Managers: The use of practice-oriented learning', paper presented to the *8th International Technology, Education and Development Conference (INTED2014)*, Madrid, Spain.

Algeo, C. 2013, 'The Researcher-Participant Relationship In Action Research: A Case Study Involving Australian Project Managers', *6th International Conference of Education, Research and Innovation (ICERI2013)*, Madrid, Spain.

Algeo, C. 2013, 'Designing Research to Understand Knowledge Exchange among Project Managers', *International Research Network on Organising by Projects (IRNOP) XI Project Research Conference*, Oslo, Norway.

Algeo, C. 2012, 'Action Research in Project Management: An Examination of Australian Project Managers', *5th International Conference of Education, Research and Innovation (ICERI2012)*, Madrid, Spain.

Algeo, C. 2012, 'Embedding Project Knowledge through Reflective Practice', *Project Management Institute (PMI) Research and Education Conference*, Limerick, Ireland.

Algeo, C. 2012, 'Learning In a Social Context to Develop Reflective Practitioners', *4th International Conference on Education and New Learning Technologies (EDULEARN12) Conference*, Barcelona, Spain.

Algeo, C. 2011, 'Do You See What I See: A project manager's knowledge nightmare', *Project Management Australia (PMOZ) Conference*, Sydney, Australia.

Algeo, C. 2011, 'Developing Reflective Project Managers', Panidea Global Webinar.

## *Doctorial Colloquiums*

Date and Location	Panel	Discussion
14 July 2012, University of Limerick, Ireland	<p><u>Svetlana Cicmil</u>, Director of Postgraduate Research, Faculty of Business and Law-University of the West of England, Bristol, UK</p> <p><u>Derek Walker</u>, Professor of Project Management at RMIT University, Melbourne, Australia</p> <p><u>Rodney Turner</u>, Professor of Project Management-SKEMA Business School, Euralille, France</p> <p><u>Barbara Edington</u>, Director, Center of Excellence in Project Management, St. Francis College, Brooklyn, NY, USA</p> <p><u>Brian Hobbs</u>, Pro Vice-Chancellor (Research), University of Glamorgan, Cardiff, UK</p>	Experiences with action research as a methodology, outline of the data collected, and the approach to analysing the data to propose recommendations
25-26 February 2011, Monash University, Melbourne, Australia	<p><u>Bob Galliers</u>, Professor, Information and Process Management, Bentley University, Massachusetts, USA</p> <p><u>Carla Messikomer</u>, Manager, Academic Resources-Project Management Institute, Newtown Square, PA, USA</p> <p><u>Andrew Sense</u>, Associate Professor, University of Wollongong, Wollongong, NSW, Australia</p>	Refined research question and methodology, research participant profiles, and proposed outline for confirmation of candidature
19-20 February 2009, University of Technology, Sydney, Australia	Audience of 49 academics from Australian Universities, representing each State and Territory	Research questions, methodology, and literature review

## **Professional Editorial Advice**

I certify that this thesis has had the benefit of professional editorial advice in the form of proofreading and formatting by Dr. Bronte Somerset.

The thesis was proofread and formatted in accordance with the Australian Standards for Editing Practice, and the University of Technology, Sydney (UTS) specific requirements for thesis presentation and submission.

Signature of Student:

Date:



## **Certificate of Original Authorship**

I certify that the work in this thesis has not previously been submitted for a degree nor has it been submitted as part of requirements for a degree except as fully acknowledged within the text.

I also certify that the thesis has been written by me. Any help that I have received in my research work and the preparation of the thesis itself has been acknowledged. In addition, I certify that all information sources and literature used are indicated in the thesis.

Signature of Student:

Date:

# Acknowledgements

*'A Teacher affects eternity; he can never tell where his influence stops.'*

Henry Adams, American historian (1838-1918)

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# Chapter 1: Introduction

*'Human behavior flows from three main sources: desire, emotion, and knowledge.'*

Plato, Greek philosopher (428-347 BC)

## **1.1 Introduction**

Since humans began to communicate, knowledge has been acquired and exchanged in whichever way was possible in order to survive and prosper. In sympathy to the issues faced when defining language, knowledge may be considered '... difficult to define ... as transitory utterances that leave no trace and as patterns of neural connectivity in the natural world's most complex brains. It is never stationary, changing over time and within populations which themselves are dynamic' (Christiansen & Kirby 2003, p. 15).

In the dynamic project management environment, project managers need to share their experience and wisdom to deliver projects. To meet the requirements of the project sponsor who is responsible for funding and approving the project, the project manager must navigate through this often changing environment to find, retrieve, and process knowledge. In this context, knowledge is ever changing and presents in many forms, making it challenging for a project manager to capture and share it. To examine the acquisition and exchange of knowledge I have focused this research on how project managers acquire and exchange knowledge.

Since 1857, the advent of modern project management was documented in Judah's 'A Practical Plan for Building the Pacific Railroad' where he was the engineer responsible for constructing a railroad across the United States of America to connect the Atlantic with the Pacific oceans. The insights of Judah (1857) into how he ensured knowledge was acquired and exchanged on this project can be seen in his comment where 'Our wisest statesmen, most experienced politicians, scientific engineers, and shrewdest speculators, have each and all discussed the subject in nearly every point of view, and given the results of their wisdom and experience to the world' (Judah 1857, p. 1).

This research focuses on how six project managers in Australia acquire and exchange knowledge in such a dynamic environment. I begin the study with an overview of project management encompassing how project management knowledge is acquired and assessed, and the current trends in project management research. My review of the project

management environment in Australia lays the foundation on which I then examine: knowledge acquisition; knowledge exchange; the physical and virtual knowledge environment, and the barriers and enhancers in each context; and the drivers underpinning knowledge acquisition and exchange.

The research was conducted using an action research methodology to develop a framework for ‘... liberating discourse to resolve mutual problems and to achieve an emancipatory outcome’ (Cardno & Piggot-Irvine 1996, p. 23). I developed a research method to include four interventions to engage with the research participants so they could inform and demonstrate how they acquired and exchanged knowledge. The interventions included individual interviews with each research participant and a work colleague; a day where I observed the research participant in their workplace; a briefing on a change which was the implementation of a tool to exchange knowledge; and a focus group meeting to review the change. To generate multiple perspectives of what the research participants said they did as well as what I observed them doing, I interviewed their work colleagues, and asked the research participants to complete two reflective journals. The first reflective journal captured how they exchanged knowledge before I instigated a change to their usual practice. The change was implemented using a tool I developed, called a ‘Knowledge Exchange Instrument’. This tool posits questions on knowledge exchange practices, with the outcomes discussed in a focus group meeting with all the research participants, and reflections were captured in a second reflective journal.

I used an interpretivist approach to understand the dynamic project environments in which the research participants acquire and exchange knowledge. I will demonstrate the significance of my research through the impact it would have on theory, methodology, practice and policy. The research addresses three interpretivist perspectives suggested by Voce (2004), according to ontology, epistemology, and methodology. The ontological perspective of the research suggests my interpretations alone may be subjective so I designed the research method to collect data from interviews, observations and from work colleagues of the research participants. A focus group meeting and research participants’ reflective journals were another medium to contribute to the study in direct and indirect ways. However, the analysis of the data and interpretation of the findings can be described as subjective, and may never be perfect. The epistemological perspective of the research is based on my 20 years of experience working as a project manager, which inspired my desire to address the problem of knowledge loss. To manage the possible influence this experience may have on my understanding of the research I used a personal reflective journal throughout the study. I also asked the research participants to use reflective journals, which provided each of us with a

way to capture and better understand our thoughts, and meaning behind our actions. The methodological perspective of the research is addressed in how I engaged with the research participants in their workplace where I conducted open interviews before observing their actions *in situ*. I analysed the data based on grounded theory technique using coding words, sentences, and paragraphs to identify themes and patterns for each intervention which I then compared to behaviour and discourse between what the research participant said they did, what I observed them doing, and what their work colleagues said they did.

## ***1.2 Outline for the Thesis***

This thesis comprises six chapters each leading the reader through my study into how project managers in Australia acquire and exchange knowledge. The following information summarises the content of each chapter:

### **Chapter 1: Introduction**

This chapter includes an introduction to the research; an outline for the thesis; defines the research problem; identifies my personal research motivations; justifies the investigation; identifies the research questions; discusses the selection of an action research methodology; highlights what I ascertained, and my contributions.

### **Chapter 2: Literature Review**

The literature review chapter examines the project management context by reviewing project management practice, research, qualification and certifications; the management of project knowledge; explicit and tacit knowledge acquisition; knowledge exchange; the physical and virtual knowledge environment, and the barriers and enhancers in each context; and what drives people to acquire and exchange knowledge.

### **Chapter 3: Research Methodology and Method**

The research methodology and method chapter introduces the research questions, paradigm, framework, methodology, and method; the approach used to collect and analyse the data; and how quality was assured throughout the research.

## **Chapter 4: Data Collection and Analysis**

The data collection and analysis chapter includes an examination of the research questions; a detailed outline of who participated in the research and a chronology of the contacts made; the approach to data collection and transcription; analysis of the data presented in two parts; the research participant reflections from their two reflective journals; an examination of an external reference group; and research ethics.

## **Chapter 5: Discussion**

The discussion chapter examines the research claims and counter claims, with supporting evidence presented in the divergence between and convergence of the literature and data within the project management context, knowledge acquisition and exchange, and the knowledge environment and drivers; the theoretical framework is presented by deconstructing three theories and then identifying how each converges with or diverges from the literature and data before confirming and suggesting extensions; and how the research was validated and evaluated.

## **Chapter 6: Conclusions and Implications**

The conclusions and implications chapter offers a response to the research questions; justifies the research; outlines the contributions to theory, methodology, practice and policy; examines the limitations to the research and suggests further research; and includes my personal reflections.

## **References and Appendices**

All sources have been acknowledged in the reference section, and the appendices are included in each chapter to support the research.

### ***1.3 The Research Motivation***

I was motivated to understand how project managers can be assisted to improve practice, having experienced first-hand *ad hoc* approaches when I worked as a project manager between 1985 and 2005 in the financial services and health sectors in Australia and Asia. The project outcomes achieved in the course of the work were, at times, not aligned to the organisation's strategic focus and resulted in suboptimal or partially complete outcomes and

missed opportunities. I wanted to ascertain which factors influenced these outcomes; so I narrowed my focus to project managers so I could understand the underpinning drivers of how they acquire and exchange knowledge. In my academic experience teaching project management students' I have also experienced reluctance amongst the students to exchange knowledge unless I embed a formal and sometimes assessable approach into a subject. During the research I was further motivated by observing several of the research participants who were addressing knowledge loss in their respective organisations. In undertaking this research my desire is to develop an approach to understand and facilitate the acquisition and exchange of knowledge for the research participants, and one would hope, to the larger community of project managers.

### ***1.4 Justification for the Investigation***

The investigation into how project managers acquire and exchange knowledge was motivated by my personal experiences noted in this chapter in 'Section 1.3 The Research Motivation' which led me to undertake a detailed literature review. Through a review of the project management, knowledge management and general management literature, I found there was a plethora of information available. I reviewed over 880 journal articles, books and book chapters, government and professional association reports, and the internet and found that most research covered either the technical aspects of knowledge transfer using formal systems or the psychological basis for sharing knowledge, not acquisition or exchange.

I was buoyed by a single reference which focused my attention on the gap between what existed in the literature and what I had experienced in practice. Zellmer-Bruhn (2003) suggests '... knowledge transfer in general and knowledge acquisition in particular, across team boundaries have received little research attention' (Zellmer-Bruhn 2003, p. 515). I then sorted the literature into clusters around themes emerging in different sectors such as education, management, nursing, and information technology, as well as project management. Finally, I decided to structure the review into four literature themes based on knowledge acquisition and knowledge exchange, including an examination of the physical and virtual knowledge environment, and the drivers behind knowledge acquisition and exchange.

### ***1.5 Identification of the Research Questions***

The research questions emerged from a review of the literature informing the research concern that project managers may not effectively exchange knowledge, and there is an apparent intergenerational loss of project management knowledge. I initially identified two

primary research questions and a secondary research question to begin the literature review. The primary focus was on how project managers *acquire* project management knowledge, and how they then *exchange* project management knowledge. A secondary research question was prepared to identify the knowledge *sources* used by project managers to acquire and exchange project management knowledge. As I was reviewing the literature, the initial research questions were reframed to focus on four literature themes. The four research questions which link knowledge acquisition and exchange to the sources impacting this to occur, are:

1. WHAT are the sources of knowledge? This leads to an examination of how project managers *acquire knowledge*.
2. HOW does knowledge exchange happen? This leads to an examination of how project managers *exchange knowledge*.
3. WHERE does knowledge exchange happen? This leads to an examination of the project management *environment*.
4. WHO makes knowledge exchange happen? This leads to an examination of what *drives* knowledge exchange.

## ***1.6 Selection of Research Methodology***

The research is positioned in a reality which is unable to be separated from what transpires during the acquisition and exchange of knowledge, and as such is aligned to the interpretivist research paradigm. To undertake research into experiential practice, I investigated several research methodologies using a variety of approaches to solve problems in a social setting. The Checkland and Scholes (1990, p. 283) Framework, Methodology and Action (FMA) model contributes a general perspective of how I considered the study would unfold. Cicmil (2006) developed a framework of ideas to address ‘... the relationship between the research process and the nature of knowledge created through this process’ (Cicmil 2006, p. 29) which added further depth to the FMA model, specifically in project knowledge. I then reviewed a dual cycle approach to solving a problem proposed by McKay and Marshall (2001) to identify how cycles of problem-solving activity can be incorporated into the research interest. This dual cycle approach contributed depth to the action research approach, but still did not yield a framework to address all the areas I was planning to study. After reviewing these different research approaches, that they all linked to action research in various ways. As ‘... action research is often orientated toward solving specific problems’ (Patton 2011, p. 280), I concluded the action research methodology would offer an approach to understand how knowledge is acquired and exchanged by project managers in the workplace. The action research methodology involves ‘... collaborative inquiry carried out by people affected by a



problem or concern, often using a cyclical process to increase their understanding of the real problem before moving towards a solution' (Sankaran, Hou Tay & Orr 2009, p. 181). These cycles of evaluation are recommended as a way of '... pursuing multiple sources of information' (Dick 1999b, p. 4), where the researcher should '... ask more questions and give fewer answers' (Dick 2009, p. 427).

The action research approach I developed to undertake the study began with a close alignment to the Problem Resolving Action Research (PRAR) Model designed by Piggot-Irvine (2001, p. 155). I initially set up three interventions aligned to the PRAR model's three action research cycles. In developing this approach I had underestimated the need for more interaction with the research participants and an external reference group. As I completed the first intervention it became clear from my own reflections additional interventions with the research participants, and interactions with the external reference group, were required. These additional contacts were used to develop a knowledge exchange instrument which I designed in order to implement a change in the research participant's environment. A research partnership emerged between the external reference group and myself, and separately, between the research participants and myself, altering the PRAR model, and creating a framework where external expertise was added to the model. Through using this augmented action research approach, I developed a framework to understand how the research participants acquire knowledge, the dynamic nature of knowledge exchange, the impact of the research participant's environment on knowledge exchange, and the personal drivers to acquire and exchange knowledge.

## ***1.7 What was Discovered***

As the research participants and I were making sense of how knowledge is acquired and exchanged in the project environment, I was able to establish a reality through practice to help '... clarify your thinking, pose new questions and pursue issues only dimly perceived before' (Holly 1984, p. 39). I developed new knowledge from reviewing the literature, analysing the data, and confirming and where appropriate, extending relevant theories. The research illuminates how project management knowledge is acquired through a combination of factors including formal training, and informal mentoring that is embedded through work experiences. Project managers exchange knowledge in a predominantly impersonal and formal manner, and the exchange is systematic and social, resulting in beneficial outcomes. Organisational culture and politics can enhance or create barriers for the project manager to acquire and exchange knowledge, as does their personality, which drives instinctive behaviours. This study identifies

that qualifications and experience have a direct impact on the ability for project managers to acquire and exchange knowledge and that inconsistent approaches to the creation of learning opportunities limits this ability.

By comparing what the research participant said they did to exchange knowledge with what their work colleague said they did, and then comparing this to what I observed in the workplace, I revealed a consistent disconnect between what the research participants said they did and what they actually did. This disconnect indicates a social dynamic in the project and perhaps the research participant's organisation in general, and a gap between the reality I observed and documented and the work colleagues view of how knowledge is transparently exchanged. Each work colleague interviewed worked with a different research participant, and yet to have all six work colleagues agree that their research participant exchanged knowledge in an 'Impersonal and Informal' manner was surprising. Only one of the work colleagues aligned with what their research participant said they did to exchange knowledge, although not with any of my observations. While it was expected that there might be some differences between my observations and the research participants' view of themselves, indicating less than perfect self-awareness, the consistently different results from the work colleague's evaluation of their research participant was unexpected.

After collecting and analysing the data from the four interventions I revisited Social Exchange Theory (Blau 1964; Cropanzano & Mitchell 2005; Emerson 1976; Hall 2001; Homans 1958; Molm 2001), the Theory of Action (Argyris 1995; Argyris & Schön 1978, 1996; Klev & Levin 2012), and the Theory of Reasoned Action (Ajzen 2005; Ajzen & Fishbein 1980; Fishbein & Ajzen 1975; Hale, Householder & Greene 2003; Sheppard, Hartwick & Warshaw 1988) to identify any divergence or convergence to the literature and data. This examination of the three theories produced five areas where the theories could be further extended. The extensions to the theories included for Social Exchange Theory where the research suggested tacit knowledge could be acquired through communities of practice; in the Theory of Reasoned Action performance can be improved through knowledge exchange; and in the Theory of Action and the Theory of Reasoned Action where personality, motivation and behaviours have an impact on knowledge acquisition and exchange.

## ***1.8 Contributions***

Through undertaking this study into how project managers acquire and exchange knowledge I have examined the research questions and made contributions to theory, methodology,

practice and policy. The contribution I have made to theory was applying the Theory of Social Exchange, the Theory of Action and the Theory of Reasoned Action to project management. I examined these three theories and compared them to the literature and the data so as to identify any convergence or divergence, to be able to confirm and suggest extensions to those theories.

I propose an extension to Social Exchange Theory through the formation of communities of project management practice to exchange tangible and intangible assets between individuals from a direct or indirect network of influence. I suggest the Theory of Action could be extended by applying the theory's behavioural criteria to project managers to understand the differences in their behaviour at various times when managing projects. I examined the Theory of Reasoned Action and suggest this theory can be extended to project managers as a decision-making framework to determine project goals or outcomes. I also suggest the Theory of Reasoned Action can be extended to encompass the influence of an organisation, or multi-unit entity, on the project manager's behaviour, which could generate social norms to further reinforce individual behaviour.

The contribution I have made to action research methodology is through the application and augmentation of Piggot-Irvine's (2001) Problem Resolving Action Research (PRAR) Model in the project management sector. The PRAR model follows three cycles: 1. Examine the existing situation; 2. Implement a change; and 3. Evaluate the implemented change, with a spin-off cycle after cycle 1 and 2 to plan, act, observe, and reflect. I augmented the PRAR model by engaging an external reference group of four respected and experienced academics and project managers throughout the study as research informants, and then research partners. In the new approach I also transitioned the six research participants from their roles as informants to partners in the third action research cycle in a focus group meeting where we evaluated the implementation of the knowledge exchange instrument I devised for the research participants to explicitly exchange knowledge.

The research I have conducted will contribute to project management practice by creating awareness of how, and providing a structured approach for, project managers to acquire and exchange knowledge. The project management literature offers a range of perspectives on knowledge transfer, sharing and exchange, and is predominantly focused at an organisational level. Through applying what the management literature has examined at an individual level to this research, I have presented a perspective on how knowledge is acquired and exchanged at the individual project manager level. I have also offered a perspective of what the research

participants think they do, with what their work colleagues suggest they do to exchange knowledge, and compared these two perspectives against what I observed *in situ*. In using the knowledge exchange instrument and the reflective journals, the research participants have suggested I have created awareness and a change in their practice of exchanging knowledge.

Through developing a policy on project management knowledge acquisition and exchange using the findings from my research, the project management sector can move toward a more informed approach in the delivery of projects. I have suggested six recommendations for new policy including:

1. An introduction to the benefits of managing knowledge in a project environment.
2. A system for recognising the knowledge already acquired by project managers and for continuously enhancing this base.
3. A framework for exchanging knowledge in a virtual and physical project environment with a range of engagement options.
4. Recommendations for the inclusion of reflective practice while managing projects, to identify issues and opportunities for process and personal improvement.
5. A structured approach identifying the underlying drivers that motivate project managers to exchange knowledge and how these can be enhanced.
6. A perspective on creating a project environment to minimise the barriers to enhancing knowledge.

I suggest there is an opportunity to embed this policy into the existing project management guides and standards, and into educational practices for teaching project management.

## Chapter 2: Literature Review

*'Literature adds to reality, it does not simply describe it. It enriches the necessary competencies that daily life requires and provides; and in this respect, it irrigates the deserts that our lives have already become.'*

Clive Staples (C.S.) Lewis, British novelist (1898–1963)

### **2.1 Introduction**

I undertook a literature review to discover why project managers do not effectively exchange knowledge despite having access to knowledge sharing tools, and if they did, why they did so in an *ad hoc* manner. Also, I was concerned about an apparent intergenerational loss of project management knowledge. I selected an action research methodology to investigate these concerns, and I undertook a literature review to gather and examine what has been published in the areas of my concerns. The outcome of the literature review assisted in determining a series of relevant research questions.

The literature review has two main themes: Management of Project Knowledge; and Knowledge Acquisition and Exchange. These two themes are further divided into the four themes of knowledge acquisition, knowledge exchange, knowledge environment, and knowledge drivers. These categories are defined in this chapter, and the gaps that led to the development of the research questions are exposed.

The review is structured around a schematic (Figure 1) to illustrate the inter-relationship between the themes.

The themes already stated of the management of project knowledge and knowledge acquisition and exchange, are then divided into the different literature clusters to establish an ordered structure.

The formation of the literature review's clusters was created according to the themes of knowledge acquisition and knowledge exchange. Two additional themes centre on the impact of the contextual environment and the drivers of knowledge. These themes and the literature clusters are represented in a research framework depicted in Figure 1 below.

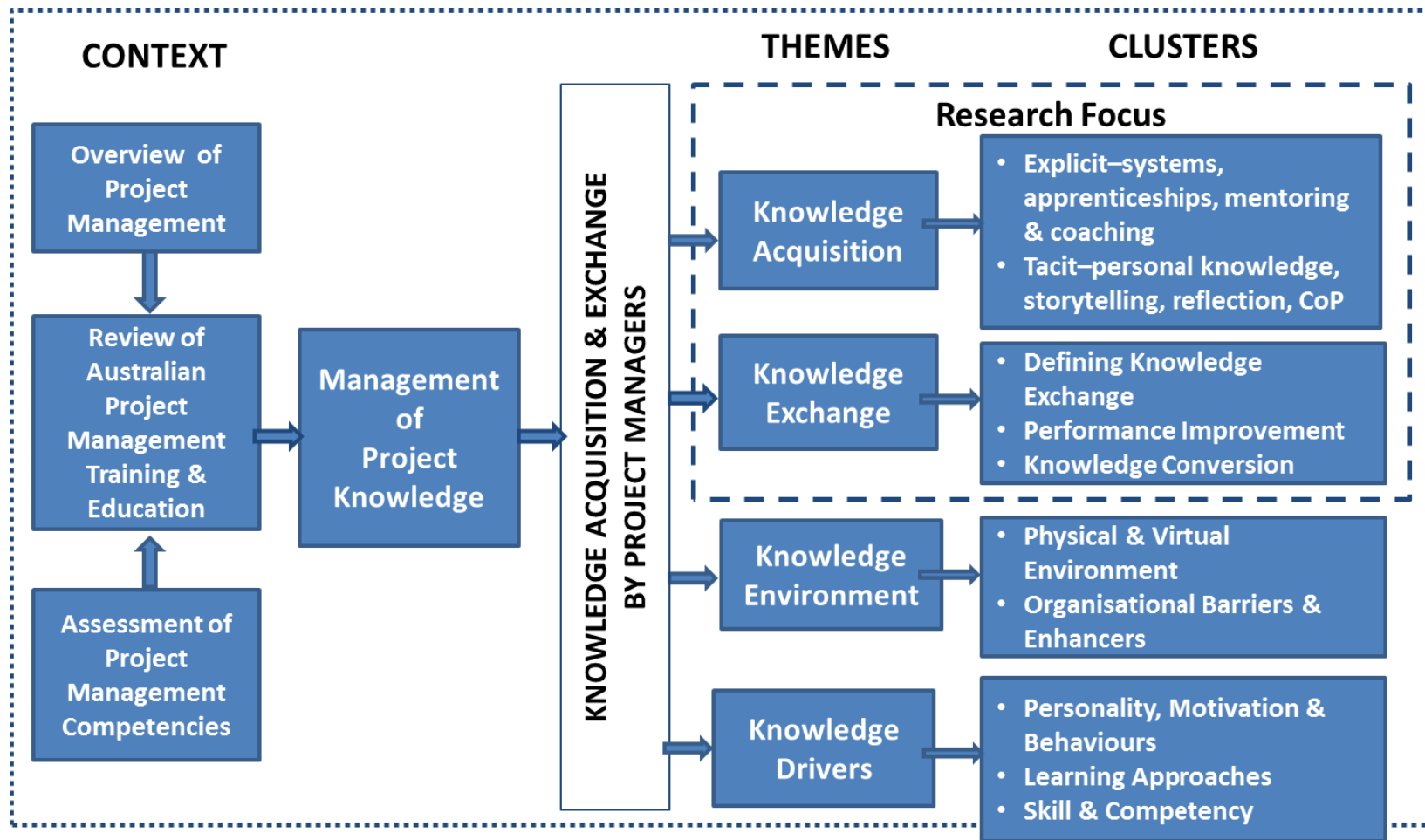


Figure 1: Research framework

In the review of these themes it became apparent that the research topic in the literature did not collectively address the ability of a project manager to acquire and exchange knowledge, nor what impact the environment and drivers have on this occurring.

## ***2.2 Project Management Context***

An overview of the project management environment in Australia was undertaken to establish the context to examine how a project manager may acquire and exchange knowledge. This includes relevant definitions and methodologies underpinning the management of projects, including seminal research directions. A review of the project management training and education, and industry association driven competency assessments in Australia presents an understanding of the options for education and for assessing the competency of a project manager.

### **2.2.1 Project Management Definitions, Methodologies and Research Directions**

The key common denominators when defining a project is that it is a temporary, unique endeavour that delivers a change. The draft of the International Standard ISO/DIS 21500 Guide on Project Management (ISO 2011) defines temporary in terms of the project being finite, either by completing to the agreed objectives, terminating when the objectives cannot be achieved or the project is no longer needed. A project is unique in that results in the creation of a product, capability or a result (Project Management Institute 2013, p. 3) and in some cases the change can be beneficial (Turner 2009, p. 2). A project is not routine or repetitive (Larson & Gray 2011, p. 6), and is not a group of related projects that could be called a program (Project Management Institute 2013, p. 4). A project is managed in most industries and disciplines within a project life cycle. This cycle describes a when a project is initiated, planned, executed, and closed (Project Management Institute 2013, pp. 38-9). Projects are monitored and controlled throughout a prescribed lifecycle to ensure that they are delivering to the agreed client specifications.

The term project management is referred to as the ‘... application of knowledge, skills, tools, and techniques to project activities to meet the project requirements’ (Project Management Institute 2013, p. 5) within a specified time. The functions of traditional project management (Turner 2009, p. 7), include an objective or purpose, a timeframe, budget and resources as well as performance requirements (Larson & Gray 2011, p. 5). The ten knowledge areas in the

generally accepted project management body of knowledge, referred to as the PMBOK® Guide (Project Management Institute 2013), include scope, time, cost, quality, human resources, communications, risk, procurement, stakeholder management, and finally how to integrate these elements to manage a project. These ten knowledge areas offer a map to manage a project according to a five step process of initiating, executing, monitoring and controlling, and closing a project to deliver an outcome.

Project management methodologies guide the delivery of projects, and organisations may adopt a variety of approaches. The majority of project managers in Australia use four project management methodologies to manage their projects. These approaches are the: 1. Project Management Body of Knowledge, referred to as the PMBOK® Guide (Project Management Institute 2013); 2. Projects IN Controlled Environments 2 (PRINCE2); 3. Logical Framework Approach (LFA); and 4. Agile Project Management. A detailed outline of these methodologies is included in Appendix 1 for reference.

A seminal research study conducted in the UK and two recent studies in Australia demonstrate what is thought-leading in project management. The Engineering and Physical Sciences Research Council (EPSRC) in the UK funded research into the concerns of project management practitioners in the areas of project complexity, social process, value creation, project conceptualisation, and practitioner development. In their 'Rethinking Project Management' research study, Winter et al. (2006) presented five key directions for the practice of project management. These directions formed theories *about*, *for* and *in* the practice of project management, with the relevant area for my research being the fifth direction which addresses 'Theory *in* Practice' (Winter et al. 2006, p. 642). This direction proposes that project managers need to become 'Reflective Technicians' who are capable of approaching complex projects reflectively while also pragmatically applying theory-in-practice. An outline of the five directions is included in Appendix 2 for reference.

An inaugural research study was undertaken in Australia between 2008 and 2010, and subsequently between 2012 and 2013. Both studies reinforced and built on the five directions identified in the 'Rethinking Project Management' (Winter et al. 2006) research study. The first Australian study was undertaken by three academics, including myself, into the current trends in Australian project management research (Sense, Owen & Watt 2011). The research identified a move towards developing the first direction on the theories of the complexity of projects and project management. The socio-cultural element of managing projects aligned to the second direction of identifying projects as social processes. The application of project



management in specific contexts addressed: all the 'Re-thinking Project Management' directions, specifically the third directions of value creation; the fourth direction of broadening the concept of projects; and the fifth direction of project managers moving towards being reflective practitioners. A subsequent study identified that the Australian research agenda is influenced by the '... interplay between project, community, globalisation and professionalization, combined with an understanding of the national and state governmental (regulatory) contexts as well as the dynamics of the emergent economy' (Hatcher et al. 2013, p. 1071). The research identified a shift in thinking from using a standardise and prescribed tools to manage projects to applying reflective practice, demonstrating that the core themes of the 'Rethinking Project Management' study (Winter et al. 2006) underpin current project management research and practice.

## **2.2.2 Project Management Training, Education, and Competency Assessments**

The project manager is responsible for managing a project and will '... plan, schedule, motivate, and control' (Larson & Gray 2011, p. 10) a finite piece of work in an ever evolving environment. To achieve an appropriate outcome, a project manager must possess specific knowledge and demonstrated competencies to deliver an outcome that meets customers' expectations. The need for a project manager to be able to develop their knowledge and competency was identified over a decade ago by Dr. Peter Morris, scholar highly regarded in the project management academic community, who concluded after analysing 763 papers and book reviews that:

*'... there is a need, fundamentally, to refocus the discipline [of project management] and its research paradigm. We need to understand better, in particular, the linkages between project management and business performance, and project management's generic responsibilities and actions in the area(s) of technology and design, IT, supply chain management ... and the way we deal with and build knowledge, learning and competency is key' (Morris 2000, p. 22).*

To achieve successful project outcomes, knowledge must be created and converted in an often evolving and dynamic environment (Nonaka, Toyama & Konno 2000). To create knowledge, a project manager can undertake technical training that involves the development of skills, habits and attitudes that result in an education. However, we often see '... the discipline of experience [that is] subjected to the tests of intelligent development and direction' (Dewey

1938, p. 90) when project managers learn by doing. To gain technical skills, a project manager can attend a standardised vocational course resulting in the award of a qualification. The course material in Australia is governed by the Department of Education, and organisations must deliver material according to a standardised curriculum established by the New South Wales (NSW) state Vocational Education and Training (VET) sector. Technical project management qualifications are offered as a Certificate IV, a Diploma, and an Advanced Diploma in Project Management. A description of each level of technical qualification is included in ascending order in Appendix 3 for reference.

When providing an education for project managers, the higher education sector needs to develop courses that deliver a specific graduate profile which include attributes that align to a specific discipline or professional standard or character. In addition to meeting these requirements, the educational aims, or graduate attributes, need to be made available to the students by the higher education institution. These attributes give students a guide on what characteristics they can expect to gain after completing their course of study. A description of each level of higher education qualification is included in ascending order in Appendix 4 for reference.

There is a concern as to the validity of a technical approach to acquiring skills at a graduate level (de Valence, Best & Watt 2007) and if the focus on skills encourages reflective development as described in the 'Rethinking Project Management' study by Winter et al. (2006). The somewhat linear progression from a *Novice* project manager to an *Expert* requires the novice to progress from learning the rules before they can begin to undertake '... participative critical reflection over the intuition' (Cicmil et al. 2006, p. 680) of themselves and the group. A definition of each progressive level is included in Appendix 5 for reference. This progression using an adaptive learning process presents a framework for the development of a project manager from a technician to a reflective practitioner, and can be simulated using problem-based learning activities. Problem-Based Learning (PBL) simulates reality for students to apply the learnt theories in a controlled environment. Boud and Feletti (1991, p. 2) identified the characteristics of PBL as an approach to education by:

- Using stimulus material to help students discuss an important problem, question or issue.
- Presenting the problem as a simulation of professional practice or an existing situation.

- Appropriately guiding student's critical thinking and providing limited resources to help them learn from defining and attempting to resolve the given problem.
- Having students work cooperatively as a group, exploring information in and out of class with access to a tutor (not necessarily a subject specialist) who knows the problem well and can facilitate the groups learning process.
- Getting students to identify their own learning needs and appropriate use of available resources.
- Reapplying this new knowledge to the original problem and evaluation their learning processes.

As a result of giving students a choice in their learning environment they are more likely to be able to competently manage change. This can be seen in their decision-making ability in unfamiliar situations where the student attempts to make reasoned decisions based on critical and creative reasoning. In a group situation self-directed learning can be used to deal with problems, providing opportunities for students to collaborate holistically. On an individual level the student can reflect on their strengths and weaknesses and how these can be managed so the team can deliver required outcomes.

An extension to Problem-Based Learning is Project Based Learning that has been developed as a '... theory and practice of engaging in time limited projects to achieve specified or emergent performance objectives (project deliverables) and to facilitate individual and collective learning' (Smith & Dodds, 1997; DeFillippi, 2001 cited in Wankel & DeFillippi 2005, p. xi). An additional approach can be drawn from Project-Based Learning that deals with ambiguity as a 'central learning trigger' (Clifford, Farran & Lodish as cited in Wankel & DeFillippi 2005, p. 12). The first trigger, leadership ambiguity, deals with the student wanting to know where they are going. Through an absence of direction, the student must observe, participate, experiment and intervene to make choices with the available resources. How the students should proceed leads to process ambiguity, where students work towards milestones but are not given direction on how to achieve them. Finally, performance ambiguity requires the student to define what success means to the project and how it is measured.

The capability of project managers to competently apply their skills and knowledge to perform certain tasks is defined by competency standards and bodies of knowledge. If a project manager is competent he or she is described as being '... properly qualified; capable' (The

Macquarie Dictionary 2009, p. 352) and can be assessed against a set of standards and established bodies of knowledge. Bodies of knowledge are often developed by industry associations and are generally accepted standards of knowledge. The dominant body of knowledge for project managers in Australia is 'A Guide to the Project Management Body of Knowledge' (PMBOK® Guide) (Project Management Institute 2013). In addition, a global guide to project management was released in 2012 by the International Organization for Standardization (ISO) group (ISO 2011). The Draft International Standard ISO/DIS 21500 Guidance on Project Management '... provides generic guidance on the concepts and processes of project management that are important for and have impact on the achievement of projects' (ISO 2011, p. 5). Finally, it should be noted that educational qualifications are a separate form of recognition of capability. An industry based certification is time limited and assesses competency, whereas an educational qualification issued by a Government registered provider, such as a university or private institution, exists for the life of the recipient. A description of the project management certifications issued by the project management associations available in Australia, and a description of the standard that each has developed, is included in Appendix 6 for reference.

The Australian project management environment is underpinned by a body of knowledge, industry certification, academic qualifications, and research-led thinking on the practice of project management. Understanding this environment establishes the context for examining how project managers in Australia may acquire and exchange knowledge.

### ***2.3 Management of Project Knowledge***

The management of project knowledge is a skill required by project managers to deliver their projects against agreed objectives by acquiring, constructing, and exchanging knowledge. The understanding of this skill is necessary for the study of project management knowledge acquisition and exchange. This section will focus on the fundamental principles of knowledge management to establish a foundation of understanding the management of project knowledge.

A critical review of the knowledge management literature in the 21<sup>st</sup> century was undertaken by Xu et al. (Xu et al. 2008) found over 10,000 papers published in academic journals. To manage this voluminous amount of literature the term 'Knowledge Management' (KM) was defined as a practice where knowledge is collected, stored, distributed and measured within an organisation. Groff and Jones (2003) extend this understanding of knowledge management

as ‘... the tools, techniques and strategies [used] to retain, analyse, organize, and share business expertise’ (2003, p. 10). The levers that can then be used to unpack knowledge in an organisation have been defined by Skyrme (2001, pp. 5-6) into seven strategic knowledge levers. These knowledge levers are described in Table 1 below with key activities to unpack the knowledge.

*Table 1: Skyrme (2001) knowledge levers adapted by Groff and Jones (2003, pp. 68-9)*

<b>Lever</b>	<b>Key Activities</b>
Customer knowledge	Developing deep knowledge sharing relationships. Understanding the needs of your customers’ customers. Articulating unmet needs. Identifying new opportunities.
Knowledge in people	Knowledge sharing fairs. Innovation workshops. Expert and learning networks. Communities of Practice.
Knowledge in products and services	Knowledge embedded in products. Surround products with knowledge, e.g. in user guides, and enhanced knowledge-intensive services.
Knowledge in processes	Embedding knowledge into business processes and management decision making.
Organisational memory	Knowledge sharing. Best practices databases. Directories of expertise. Online documents, procedures and discussion forums. Intranets.
Knowledge in relationships	Improving knowledge flows between suppliers, employees, shareholders, community, etc.—using this knowledge to inform key strategies.
Knowledge assets	Identifying intellectual and knowledge assets. Measuring and monitoring their development.

These knowledge levers can be aligned to what Haggie and Kingston refer to as ‘Knowledge Management Strategies’ (Haggie & Kingston 2003). These strategies focus on three areas of knowledge management: 1. The knowledge; 2. Business areas or processes; and 3. The end results. These focus areas were further refined by Hansen, Nohria and Tierney (1999) when they observed two distinct knowledge management strategies being used in consulting firms. The two strategies to manage knowledge were either ‘Codified’ or ‘Personalised’. Codified knowledge yields high quality, reliable, and fast implementation of information systems. This

strategy requires a relationship between people and the documents so as to develop an electronic document system that codifies, stores, disseminates, and allows reuse of knowledge. Personalised knowledge encourages creative, analytically rigorous advice on high level strategic problems by channelling individual expertise. The personalisation of knowledge requires a relationship between people so that networks can be developed for tacit knowledge to be shared (Hansen, Nohria & Tierney 1999, p. 109).

Knowledge management cycles demonstrate how problems can be solved using a cyclical approach. Dalkir's (2005, p. 12) 'Integrated Knowledge Management Cycle' focuses on knowledge being assessed, contextualised and updated, with knowledge sharing and dissemination linking how knowledge is assessed and contextualised. The premise that knowledge exchange has been used interchangeably with knowledge sharing in this integrated knowledge management cycle, referred to in Figure 2 below requires further examination.

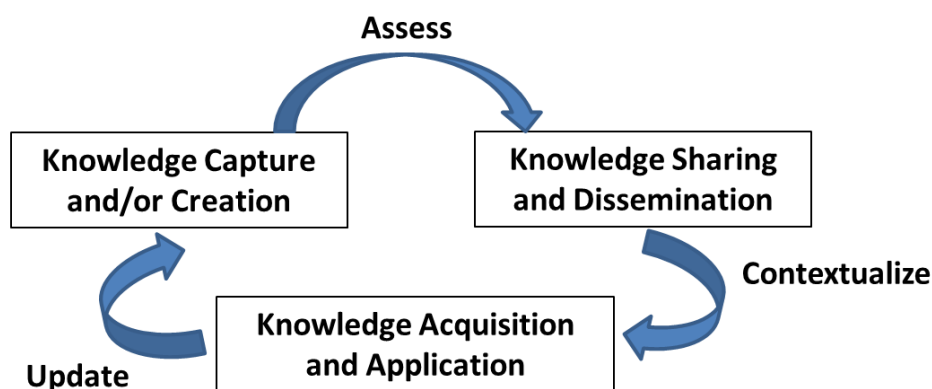


Figure 2: Integrated knowledge management cycle, (Dalkir 2005, p. 43)

An investigation into the different terms used in knowledge management cycles for the term 'knowledge exchange' is depicted below in Table 2. This table details descriptive terms used for each of the steps in the integrated knowledge management cycle depicted in Figure 2 above from the perspective of six researchers. It is interesting to note that Jashapara (2004, p. 12) and Rollette (2003) use terms specifically related to knowledge exchange but do not use this term.

Table 2: Positioning knowledge acquisition and exchange in knowledge management cycles

Author	Knowledge Acquisition and/or Creation		Knowledge Exchange and/or Dissemination	Knowledge Application
(Jashapara 2004, p. 12)	Create	Organize	Share	Apply
(Rollett 2003) as cited in (Dalkir 2005, p. 27)	Plan/ Create	Integrate/ Organize	Transfer	Maintain
(Meyer & Zack 1996) as cited in (Dalkir 2005, pp. 30-1)	Acquire/ Refine	Store/Retrieve	Distribute	Present
(Bukowitz 1999) as cited in (Dalkir 2005, p. 32)	Get/ Assess	Build/Sustain	Use/Divest	Contribute/Learn
(McElroy 2002) as cited in (Dalkir 2005, pp. 36-8)	Produce	Integrate	Distribute	Process
(Wiig 1993) as cited in (Dalkir 2005, pp. 39, 42)	Build	Hold	Pool	Apply

In the context of a project, Reich has developed a definition of knowledge management that entails ‘... the application of principles and processes designed to make relevant knowledge available to the project team’ (2007, p. 8). Kasvi, Vartiainen and Hailikari (2003, p. 572) identify four groups of activities that define knowledge in a project context which are the creation, administration, dissemination, and the utilisation of knowledge.

When managing knowledge, the project manager should be aware that ‘... effective knowledge management facilitates the creation and integration of knowledge, minimizes knowledge losses, and fills knowledge gaps throughout the duration of the project’ (Reich 2007, p. 8). A project manager would need to develop knowledge management strategies to be able to ‘... name, frame, group, and describe the phenomena of organizational [project] life’ (Argyris & Schön 1978, p. 317). The development of a process to manage knowledge may be viewed as essential when managing projects to capture what Argyris and Schön (1978) describe as the ‘modes of organizational knowing’.

Within a project management context, the Project Management Institute defines the application of knowledge management in the fifth edition of the PMBOK® Guide (Project

Management Institute 2013, p. 466). In this publication, which is generally considered one of the most contemporary and comprehensive bodies of knowledge in the project management discipline, knowledge management is referred to only in an appendix. The information contained in the appendix requires application across the many sections of the PMBOK® Guide to ensure project managers consistently handle project management data, work performance information, and work performance reports. The approach was developed to align with an early and influential model used in the field of knowledge management, the 'Data, Information, Knowledge, Understanding, Wisdom' (DIKW) model. This model was proposed by Ackoff (1989) to describe the content of the human mind in terms of past experiences of Data, Information, Knowledge and Understanding, with Wisdom incorporating future vision and design:

*'Wisdom is located at the top of a hierarchy of types ... Descending from wisdom there are understanding, knowledge, information, and, at the bottom, data. Each of these includes the categories that fall below it—for example, there can be no wisdom without understanding and no understanding without knowledge' (Ackoff 1989, p. 3).*

The alignment of the DIKW model to the PMBOK® Guide performance areas used to describe project knowledge management includes:

- **Work Performance Data.** The raw observations and measurements identified during activities performed to carry out the project work. Examples include reported percent of work physically completed, quality technical performance measures, start and finish dates of schedule activities, number of change requests, number of defects, actual costs, actual durations, etc.
- **Work Performance Information.** The performance data collected from various controlling processes, analysed in content and integrated based on relationships across areas. Examples of performance information are starters of deliverables, implementation status for change requests, forecasted estimates to complete.
- **Work Performance Reports.** The physical or electronic representation of work performance information compiled in project documents, intended to generate decisions, raise issues, actions, or awareness. Examples include status reports, memos, justifications, information notes, electronic dashboards, recommendations, and updates' (Project Management Institute 2013, p. 467).

To help situate the knowledge management literature in the management of project knowledge, we need to identify where research is focused. The following Figure 3 developed



by Zollo and Winter (2002, p. 343) depicts a map for this research as the investigation is focused on the replication of knowledge through sharing and transfer, adaptive variation, and problem solving.

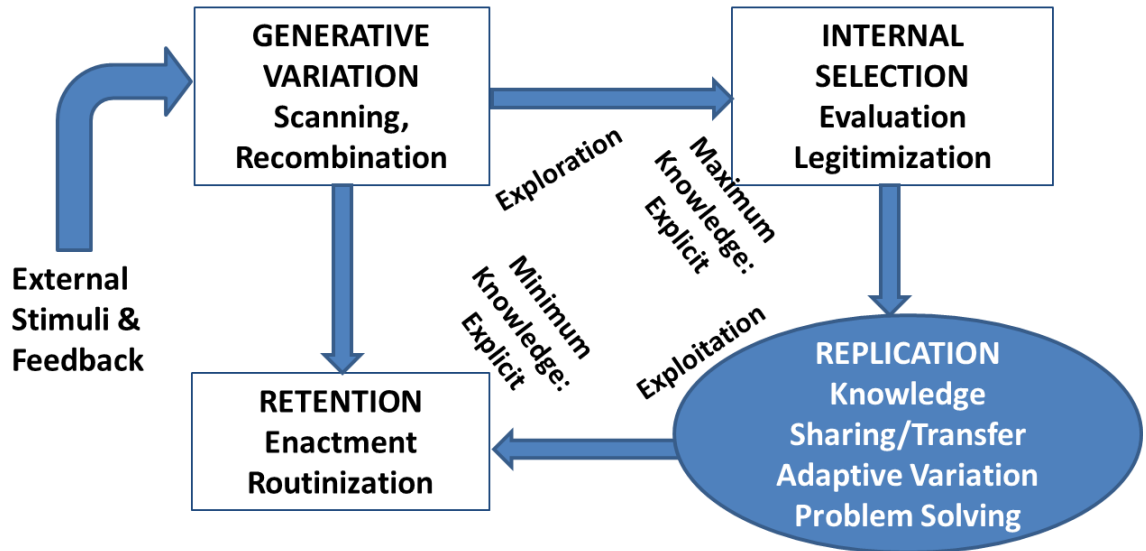


Figure 3: Activities in the knowledge evolution cycle (Zollo & Winter 2002, p. 343)

The examination of the evolution and principles of knowledge management provide a foundation to demonstrate the contextual space in which the research is situated. Further exploration of project knowledge management is built on how knowledge evolves through cycles which are adapted to deliver project outcomes.

## 2.4 Knowledge Acquisition

A person builds tacit knowledge from access to information, or other people’s ideas, which is then captured, processed and retained. Project management requires the project manager to use tools and techniques to acquire knowledge to deliver the agreed outcomes. The three steps proposed by Dalkir (2005) which apply knowledge acquisition at an individual and group level are:

1. ‘Identification: the process of characterizing key problem aspects such as participants, resources, goals, and existing reference materials.
2. Conceptualization: specifying the key concepts and the key relationships in the form of a concept or knowledge map.
3. Codification: renders validated content into an explicit form that can then be more readily disseminated throughout the organisation’ (Dalkir 2005, p. 94).

These steps will be grouped according to whether the knowledge has been acquired explicitly, that is ‘... expressed in formal and systematic language and shared in the form of data, scientific formulae, specifications, manuals’ or tacitly, that is ‘... deeply rooted in action, procedures, routines, commitment, ideals, values and emotions’ (Nonaka, Toyama & Konno 2000, p. 7).

Explicit and tacit knowledge are described by Kasvi, Vartiainen and Hailikari (2003) as the ‘Project Memory’. The project memory may also be described as the history of the project with the way to realise it termed the ‘Project Memory System’. Table 3 below summarises these two memory concepts against two knowledge management strategies, (Kasvi, Vartiainen & Hailikari 2003, p. 572).

*Table 3: Knowledge management strategies and project memories  
(Kasvi, Vartiainen & Hailikari 2003, p. 572)*

<b>Knowledge Management Strategy</b>	<b>Project Memory System</b>	<b>Project Memory</b>
Codification strategy	Traditional and new information and communication technologies (e.g. documents, databases, email)	Explicit and declarative knowledge (e.g. specifications, instructions, definitions)
Personalisation strategy	Memory representations, personal interaction (e.g. mental models, dialogues, workshops, seminars)	Tacit and procedural knowledge (e.g. competences, values, norms)

While converting tacit knowledge to explicit knowledge, the goal suggested by Dalkir (2005) is to avoid knowledge leakage by maintaining ‘... a link to knowers—individuals within the organization who are adept at making use of complex knowledge. The goal is to carry out the “right” amount of knowledge acquisition and codification’ (Dalkir 2005, p. 104).

The apparent separation between explicit and tacit knowledge has been divisive in the portrayal of knowledge being either explicit or tacit, as the ‘... specific distillation of knowledge, both tacit and explicit, [is] required to resolve an applied problem in context’ (McKenzie 2004, p. 127) and that tacit knowledge may form the basis for explicit knowledge (Gueldenberg & Helting 2007, p. 104). This suggest that ‘... explicit and tacit knowing is not separate, but rather interrelates’ (Gueldenberg & Helting 2007, p. 118) and can accelerate the creation of

knowledge ‘... when there is continual cycling from one form of knowledge conversion to another—from tacit to explicit and from explicit to tacit’ (Rynes, Bartunek & Daft 2001, p. 347).

The literature will be reviewed to describe explicit knowledge as well as tacit knowledge. Literature was also reviewed regarding the personal reflective tools and techniques available to project managers so they are able to effectively acquire and exchange knowledge.

### **2.4.1 Explicit Knowledge**

Explicit knowledge ‘... has been documented or articulated into formal language in order to be more easily transferred among individuals’ (Groff & Jones 2003, p. 10). To create a framework to facilitate the development of explicit knowledge, a project manager can engage with or develop a system to document project knowledge. This approach can be structured in a formal way through apprenticeship programs, or informally evolve with mentors or coaches, and may occur ‘... either individually or collectively’ (Nahapiet & Ghoshal 1998, p. 248).

### **Systems**

Organisations and project managers invest in ‘... knowledge repositories such as intranets and data warehouses, building networks so that people can find each other, [and information] and implement technologies to facilitate collaboration’ (Pfeffer & Sutton 1999, p. 89). The success of these explicit systems requires continuous and collaborative maintenance. However, systems that are linked to an individual’s performance ‘... discourage knowledge sharing if such sharing reduces a person’s competitive advantage’ (Huber 2001, p. 77). The management of an organisation also need to determine how to motivate people to effectively adopt, contribute to, and embrace knowledge based systems on an ongoing basis (Huber 2001, p. 72) to encourage usage. However, research conducted in the telecommunications sector found the use of technology led ‘... knowledge management solutions that had not been successful’ (Sankaran et al. 2005, p. 5). These failed due to the users not knowing how to access the data ‘... due to the uncertainty or complexity of the situation’ (Sankaran et al. 2005, p. 6).

### **Apprenticeships**

The formalised structure of sharing knowledge could be extended to an internship or apprenticeship model which is aimed at developing new skills at work. Work can be organised to follow rules of behaviour that recognise the formal relationship between the master and the apprentice. These behaviours work in settings where the knowledge is for a predictable or

stable environment or purpose. The relationship between a master and an apprentice is dynamic and often evolves as competency is attained and the ability to think and reflect is incorporated into work practices. This process of reflection-in-action can become elliptical, '... using shorthand in word and gestures to convey ideas that to an outsider may seem complex or obscure' (Schön 1987). In a project management context the '... transfer of wisdom and PM knowledge is assisted by...creating balance between existing expertise and creativity through apprenticeships, stretch assignments, coaching and mentoring' (Bourne & Walker 2004, p. 238). It is also suggested that the needs of the individual can be balanced with the needs of the organisation through dynamically '... matching project management skills to appropriate projects; and apprenticeships, coaching and mentoring' (Bourne & Walker 2004, p. 239).

The process of guiding an apprentice involves telling and listening, demonstrating and imitating, and ideally proceeds uninhibited in a supportive environment which prepares the apprentice to apply skills and knowledge to actual work situations. This form of internship can begin in an educational facility where students have the opportunity to exchange knowledge explicitly with their student colleagues and their lecturers. These types of experiences can be linked projects, which are '... educationally directed activities involving out-of-classroom action settings complemented by student and/or instructor directed reflection on the links between theory and practice' (Wankel & DeFillippi 2005, p. xi).

## **Mentoring and Coaching**

To assist with the exchange of knowledge, a project manager can be mentored or coached either in a formal or informal arrangement. The difference between these two roles is contextual and based on the experience that they have in the specific field in which the assistance is required. A coach:

*'... enables learning and development to occur and thus performance to improve. To be a successful, a coach requires a knowledge and understanding of process as well as the variety of styles, skills and techniques that are appropriate to the context in which the coaching takes place' (Parsloe 1999, p. 8).*

A mentor offers '... off-line help by one person to another in making significant transitions in knowledge, work or thinking' (Clutterbuck 1999, p. 3). Both the mentoring and coaching relationship is based on working with a person or team to facilitate the exchange of knowledge outside the normal manager-subordinate relationship. This structured form of knowledge exchange is '... designed to create effective mentoring relationships, guide the desired

behavior change of those involved, and evaluate the results for the protégés, the mentors, and the organisation' (Murray 1991, p. 5).

The intention is to give the less experienced person ideas, real life experiences and support, whether in regard to a particular situation, challenge, or project. They also guide the people being mentored when addressing issues and opportunities that may otherwise not be possible. A survey of mentoring and coaching administrators in urban and rural schools in North Carolina and Mississippi found that '... a mentoring program can provide great benefits to organizations, to mentors, and to protégés' (Hopkins-Thompson 2000, p. 36). These benefits have increasingly been the result of '... introducing formal mentoring and coaching opportunities' (Crawford et al. 2006, p. 727) rather than the informal approaches adopted in the past.

### **2.4.2 Tacit Knowledge**

The second classification of knowledge to be reviewed is tacit knowledge, which is described as '... personal knowledge embedded in individual experience and involving intangible factors such as personal belief, perspective, and values' (Groff & Jones 2003, p. 10) and '... contains emotions' (Bratianu 2014, p. 196). Tacit knowledge from past experiences can assist team members to not only interpret and effectively apply external knowledge, but can also help to avoid mistakes and build on previous successes (Haas 2006).

The exchange of knowledge may not follow established rules, but may be more intuitive leading the project manager to instinctively make decisions (Lehrer 2009) that are not explicit. The interpretation of these rules may be driven through experiences which Maslow (1987) suggested were the result of a biological efficiency to meet a goal. These behaviours may be based on personal knowledge, knowledge attained through sharing stories or reflecting on actions, or participating in communities of practice.

### **Personal Knowledge**

How an individual project manager acquires and then exchanges knowledge relies on explicit truths being passed from person to person without attaching bias '... for only the explicit, formulable core of knowledge can be transferred, neutrally, from person to person' (Polanyi 1969, p. x). The journey from a state of not knowing to an altered state of knowing implies that the person creating the knowledge has the power to move from one state to another. This

movement was built on earlier work by Polanyi (1957) where he proposed three functional patterns of knowledge exchange: 1. Reciprocity; 2. Redistribution; and 3. (market) Exchange.

Building on Polanyi's underlying states of knowing, Martin (2000) suggests that '... personal knowledge management is knowing what knowledge we have and how we can organize it, mobilize it and use it to accomplish our goals – and how we can continue to create knowledge' (Martin 2000, pp. 1-2). Personal knowledge '... is the least accessible but most complete form of knowledge. It is typically more tacit than explicit and is used nonconsciously [sic] in work, play, and daily life' (Dalkir 2005, p. 64).

The capacity to '... extend the organization's capability to make informed, rational decisions ... [is enhanced by the]... transformation of personal knowledge between individuals through dialogue, discourse, sharing, and storytelling' (Dalkir 2005, p. 60).

## **Storytelling**

Storytelling is common to interpersonal communication and serves as another vehicle for exchange. Storytelling tradition relates to exchange of knowledge where '... essential knowledge, including technical knowledge, [which] is often transferred between people by stories, gossip, and by watching one another work. This is a process in which social interaction is often crucial' (Pfeffer & Sutton 1999, p. 90). Relating stories of lessons learned which resulted in successful outcomes, or not, creates an effective medium to exchange knowledge. 'Storytelling is probably the oldest art form, and is just as effective today as any time in history. People think in terms of metaphors and learn through stories' (Martin 2000, p. 10). Laufer and Hoffman (2000) undertook an 'Excellence Through Stories' project as '... the study of success stories told by practitioners is unique in its capabilities to generate and disseminate knowledge' (2000, p. xvi). Project managers working with the US Department of Defence (DOD) and the National Aeronautics and Space Administration (NASA) were invited to share their knowledge of a specific project with '... meaningfulness, clarity, and interest [to] clarify thinking, capture the imagination, and excite and energise people' (Laufer, Post & Hoffman 2005, p. 4). The process of sharing tacit knowledge in a social context highlights the value of relationships in knowledge exchange.

Storytelling can also be referred to as 'unpretentious narrative' (Clandinin & Connelly 1991) or 'narrative inquiry' (Mattingly 1991) as 'Telling stories offers one way to make sense of what has happened. We may even catch a level of meaning that we only partially grasped while

living through something' (Mattingly 1991, p. 235). Storytelling can also be seen as a mode of reflection:

*'... for storytelling is the mode of description best suited to transformation in new situations of action.... Stories are products of reflection, but we do not usually hold onto them long enough to make them objects of reflection in their own right.... When we get into the habit of recording our stories, we can look at them again, attending to the meanings we have build [sic] into them and attending, as well, to our strategies of narrative description' (Schön 1988, p. 29).*

Situations are able to be perceived differently and behaviours can be modified accordingly through organisational narrative. 'Storytelling is natural and easy, entertaining and energising' (Denning 2001, p. xv). Through the medium of storytelling, project managers have the ability to share messages that may assist with understanding complexity where '... stories are driven forward by a detailed explanation of the cause-and-effect relationship between an action and its consequence' (Denning 2006, p. 45).

## **Reflection**

Reflection is referred to by Boud, Keogh, and Walker (1985) as '... a generic term for those intellectual and affective activities in which individuals engage to explore their experiences in order to lead to new understandings and appreciation' (Boud, Keogh & Walker 1985, p. 3). Project managers collaborate in a social context and can further shape, build, develop and embed their knowledge through individual reflection. The exploration of how the self has interacted and reacted under certain circumstances can illuminate future pathways not previously considered. In my experience, the process of reflection is often ignored in practice in the quest to deliver outcomes in the ever changing and busy environment of managing projects.

A view that investment in reflection can enhance the ability to make sense of the actions and interactions is a separate body of literature. The process of sensemaking '... involves the ongoing retrospective development of plausible images that rationalize what people are doing' (Weick & Sutcliffe 2005, p. 409). Sensemaking requires an external trigger to identify priorities that can be used as a filter for the information so '... individuals [can] construct common interpretations from the exchange and negotiate information fragments combined with their previous experiences' (Dalkir 2005, p. 58). This process of rationalising and organising information requires those involved to '... extract cues and make plausible sense

retrospectively, while enacting more or less order into those ongoing circumstances’ (Weick & Sutcliffe 2005, p. 409). An integrated process of sensemaking in organisations is proposed by Weick (2001) and consists of four steps: (1) ecological change; (2) enactment; (3) selection, and (4) retention. As the research is focused on the way in which project managers acquire and exchange knowledge, the sense-making literature, and associated literature of cognitive dissonance, has not been further explored.

The key constants of a reflective practitioner according to Schön (1987) are compared to the framework introduced by Dewey (1916), in Table 4 below. The ‘Rethinking Project Management’ study drew on Schön’s (1987) early observation that ‘... research functions not as a distraction from practice but as a development of it’ (Schön 1983, p. ix).

*Table 4: The essentials of reflective practice (Dewey 1916) and (Schön 1987)*

<b>Dewey (1916)</b>	<b>Schön (1987)</b>
A genuine situation of experience	The media, languages, and repertoires used by practitioners to describe reality and conduct experiments
A genuine problem in that situation	The appreciative systems they bring to problem setting, to the evaluation of inquiry, and to reflective conversation
Opportunity and occasion to test ideas by application, to make the meaning clear and discover for self their validity	The overarching theories by which they make sense of phenomena
Information and observation about the situation and suggested solutions for which the learner will be responsible	The role frames within which they set their tasks and through which they bound their institutional settings

An extension to the ‘Rethinking’ study proposed the level of expertise, competence and knowledge in project work and management was linked to the reflective capability of the practitioner. The proficient performer was noted as possessing ‘... reflective understanding and participation in power relations’ and the expert or virtuoso exhibited ‘... participative critical reflection over the intuition – the self and the group’ (Cicmil et al. 2006, p. 680).



Professional artistry or ‘... competency practitioners display in unique, uncertain, and conflicted situations in practice’ (Schön 1987, p. 13) relies on the ability of project manager to recognise, judge and then deliver, which is also referred to as reflection-in-action. Project managers can develop reflection-in-action but it depends on how they review an unexpected outcome after following a known course of action. The project manager may stop after the event and reflect or stop during the event and take corrective action, with the reflection being unconnected with the anticipated outcome. This structured approach to reflective practice can be undertaken using tools, such as reflective journals, voice recordings, emails to self, or any other appropriate way, will assist the project manager to develop problem solving skills to help adapt to the changing environment. A project manager will need to pursue an:

*‘... active, persistent, and careful consideration of any belief or supposed form of knowledge in the light of the grounds that support it and the further conclusions to which it tends constitutes reflective thought [which] includes a conscious and voluntary effort to establish belief upon a firm basis of evidence and rationality’ (Dewey 1933, p. 9).*

Understanding the implications, as Cicmil et al (2006) discovered, of the need for project managers to practice reflection based on the essentials of reflective practice (Dewey 1916) and (Schön 1987) is central to the acquisition of knowledge that may then be exchanged.

## **Communities of Practice**

Estabrooks et al. (2006) links communities of practice to knowledge sharing by suggesting ‘... epistemic cultures, refer to communities in which people learn and exchange knowledge and which are also the sites of knowledge production’ (Estabrooks et al. 2006, pp. 32-3). Lave and Wenger (1991) developed a process called ‘legitimate peripheral participation’ which acknowledges the experienced worker who facilitates the learning of the new worker through a social process. The ‘... activities, identities and artefacts, and communities of knowledge and practice’ (Lave & Wenger 1999, p. 83) offer a social way for the individual to gain skills. This social process occurs in communities of practice which contain ‘... groups of people informally bound together by shared expertise and passion for joint enterprise’ (Wenger & Snyder 2000, p. 139). Swan, et al. (1999) prescribes ‘... deliberately creating communities with an appropriate mix of skills, expertise and personality and then providing plenty of opportunity for intense interaction and interrelating’ (Swan et al. 1999, p. 14). A project team can be described as a ‘... an embryonic Community of Practice’ (Sense 2003, p. 9).

The professional project management associations facilitate formal and informal knowledge exchange through communities of practice, conferences, journals and mentoring programs. In this context, the exchange of knowledge can be amplified through Nonaka, Toyama and Konno's (2000) SECI model starting with individuals '... and expanding as it moves through communities of interaction' (Nonaka, Toyama & Konno 2000, p. 12). These communities of practice create '... shared identity, foster commitment/obligation and codependence and support social interaction' (Hall 2001, p. 15) which facilitates knowledge exchange within the following guidelines:

- 'Provide clear rules on the operation of the community.
- Make provisions for shared cognition through a common framework of language.
- Encourage social events for staff.
- Co-locate staff.
- Provide opportunities for colleagues to create shared history in order to develop "prior relationship" histories' (Hall 2001, p. 17).

Communities of practice, or knowledge and practice networks, emerge if an organisation can offer the appropriate support (O'Dell & Jackson Grayson 1998, pp. 161-2), in addition to technology '... relationships among members and a shared sense of purpose bring them to life' (Smith & Farquhar 2000, p. 28). To effectively exchange tacit knowledge between groups '... customized exchanges with high levels of human asset specificity require an organizational form that enhances cooperation, proximity, and repeated exchanges' (Jones, Hesterly & Borgatti 1997, p. 920).

## ***2.5 Knowledge Exchange***

The term to exchange knowledge is deconstructed in this section and reviewed against several definitions so as to lay a foundation to explore the literature on performance improvement and knowledge conversion. The following section relates this exploration to the project manager with subsequent sections exploring the environment in which work is conducted, with a view to develop a clear understanding of knowledge exchange. In addition, I will review the tools and techniques used to exchange knowledge in various contexts.

### **2.5.1 Definition of Knowledge and Knowledge Exchange**

To situate this research in the literature, a definition is necessary for the term 'knowledge' as it is different from 'information' as '... true knowledge assets... can only exist within the context

of an intelligent system ... the human knowers, and not the organization per se' (Dalkir 2005, p. 26) as information is 'digitizable'. Knowledge can be defined as '... a fluid mix of framed experience, values, contextual information and expert insight that provides a framework for evaluating and incorporating new experiences and information' (Davenport & Prusak 1998, p. 5). To ensure knowledge has meaning, it '...must be continuously re-created and re-constituted through dynamic, interactive and social networking activity' (Swan et al. 1999, p. 14).

In the context of a project, knowledge management can be defined as '... the application of principles and processes designed to make relevant knowledge available to the project team. Effective knowledge management facilitates the creation and integration of knowledge, minimizes knowledge losses, and fills knowledge gaps throughout the duration of the project'. (Reich 2007, p. 8). I compared this definition against a project-specific definition of knowledge management when examining the project management work, execution data, and information flow. The only reference to knowledge management in the PMBOK® Guide states:

*'... to improve consistency and add clarity regarding project data and information flow during project work execution, the team redefined work performance data, work performance information, and work performance reports to align with the Data, Information, Knowledge, Wisdom model (DIKW) used in the field of knowledge management' (Project Management Institute 2013, p. 466).*

However, '... designing a portal to enhance knowledge sharing is an act of knowledge management ... knowledge sharing is not the same as knowledge management' (McElroy 2002, p. 12). If project managers are to exchange knowledge, '... projects and project organizations require exceptionally efficient knowledge management' (Kasvi, Vartiainen & Hailikari 2003, p. 578) systems. Ruggles and Holtshouse (1999) identified the following key attributes of knowledge management, as cited in Dalkir (2005), noting the requirement to share knowledge includes:

- 'Generating new knowledge.
- Accessing valuable knowledge from outside sources.
- Using accessible knowledge in decision making.
- Embedding knowledge in processes, products and/or services.
- Representing knowledge in documents, databases, and software.
- Facilitating knowledge growth through culture and incentives.
- Transferring existing knowledge into other parts of the organization.

- Measuring the value of knowledge assets and/or impact of knowledge management’ (Dalkir 2005, p. 11).

A range of terms used to describe the exchange of knowledge in the literature. I have adopted the term knowledge ‘exchange’ for the purposes of this research as it closely fits the ideal of the project manager being able ‘... to give and receive reciprocally’ (The Macquarie Dictionary 2009, p. 577). The term ‘knowledge transfer’ was considered, although I did not believe knowledge was to be conveyed or removed ‘... from one place, person, etc. to another’ (The Macquarie Dictionary 2009, p. 1748). In addition, ‘... knowledge transfer ... has sometimes been interpreted as, and criticized for, suggesting that the process is unidirectional, from knowledge producers to stakeholders’ (Graham et al. 2006, p. 16). The third perspective investigated was whether knowledge was shared, although this was limited by the concept of joint knowledge, as defined by the Macquarie Dictionary (2009), ‘... to use, participate in, enjoy, etc. jointly’ (The Macquarie Dictionary 2009, p. 1514). The literature intermingles the terms exchange, transfer and share, and where the literature is directly quoted the terms will be used, however in the explanation of the literature in regard to the research, the term ‘knowledge exchange’ will be used.

The term knowledge exchange is considered to be the deliberate interaction between decision makers and other individuals or groups of people who are working together to achieve an outcome, and can be ‘omnidirectional’. Knowledge exchange is a social process where various contingent histories, professional perspectives, and local conditions interact in a systematic, mutual way to share tacit knowledge in order for it to become explicit knowledge. The World Bank refers to knowledge exchange as a ‘... powerful way to share, replicate, and scale up what works in development’ (Kumar & Leonard 2011, p. 1) in terms of peer-to-peer learning,

*‘However, with a few notable exceptions (Ferlie et al. 2005; Nonaka & Takeuchi 1995; van de Ven et al. 1999), there are very few descriptions of how knowledge exchange unfolds in practice settings .... this has hampered attempts to produce realistic and useful models and frameworks which can help policymakers and researchers understand how knowledge exchange works and how formal knowledge translation interventions can add value.’ (Ward et al. 2012, p. 2).*

The behaviours of individuals or the broad workplace environment may encourage or restrict knowledge exchange, with further discussion on potential enhancers and barriers addressed in ‘Section 2.6.3 Barriers and Enhancers to Knowledge Exchange’ in this chapter. The context of this research does not extend to identify if the knowledge that has been exchanged generates

new knowledge. However, approaches driving knowledge exchange are discussed in this chapter in 'Section 2.7.2 Learning Approaches'.

## 2.5.2 Performance Improvement

The exchange of knowledge can lead to demonstrated performance improvement, as described by O'Dell and Jackson Grayson (1998, pp. 158-9). In their case study of major corporations in the USA, such as Chevron, General Motors and Texas Instruments, they found the following compelling reasons why organisations are interested in knowledge exchange, as it led to: a compelling call to action; demonstrated success; decentralisation and downsizing; benchmarking evidence; and recognition of the potential gain.

To enhance performance, Hall (2001) suggests:

*'... organizations need to find ways to encourage individuals, who have complete discretion over how they handle their knowledge assets, to use them for the benefit of the firm by sharing what they know openly and freely. They want to discourage knowledge hoarding—both wholesale and partial—and knowledge loss caused by employee departure' (Hall 2001, p. 1).*

## 2.5.3 Knowledge Conversion

To achieve appropriate outcomes, knowledge may be created and converted in an often evolving and dynamic environment over time. Nonaka, Toyama and Konno (2000, p. 8) have developed a 'Model of Dynamic Knowledge Creation' to define the knowledge creation process in terms of three elements:

1. The SECI process: the conversion between tacit and explicit knowledge through Socialisation, Externalisation, Combination and Internalisation.
2. *ba*: A place where knowledge sharing, creation and utilisation can be shared.
3. Knowledge Assets: The moderation of inputs and outputs to the knowledge creation process defined as experiential, conceptual, systematic and routine.

According to Nonaka, Toyama and Konno (2000, p. 9) a practitioner converts explicit knowledge to tacit knowledge, resulting in an anticipated expansion in the quantity and quality of knowledge. The four modes of this conversion are summarised below:

- Socialisation: conversion of new tacit knowledge through shared experiences, often in a shared environment where an apprentice can observe, interact and socialise, often beyond the organisational boundaries.
- Externalisation: articulating tacit knowledge into explicit knowledge with others to create new knowledge.
- Combination: conversion of explicit knowledge to more detailed explicit knowledge through gathering data internally or externally and then sharing it within the organisation.
- Internalisation: taking the shared explicit knowledge and converting into tacit knowledge by the individual.

Through simplifying the conversion of knowledge ‘... Nonaka is blurring the lines between individuals and groups’ (Bratianu 2014, p. 195) and does not explicitly consider reusable knowledge in the transformation of knowledge (Harsh 2009, p. 2). An alternate knowledge creation model by Fong (2003) emphasises the processes of multidisciplinary knowledge creation, rather than the outcomes proposed by Nonaka, Toyama and Konno (2000). This knowledge creation process model is based on five interlinked processes which are: 1. boundary-crossing; 2. knowledge-sharing; 3. knowledge generation; 4. knowledge integration; and 5. collective project learning. Throughout the project’s lifecycle, new knowledge and insights are created or combined in a non-linear way across multi-disciplinary project teams. Before knowledge could be created Fong (2003) found ‘... project teams needed to cross boundaries imposed both by the range of diverse professional disciplines and also by the hierarchical divisions of client, consultant and contractor’ (2003, p. 484). This collaborative and iterative process identified and solved problems, allowing knowledge resulting from positive and negative experiences to be shared, as seen in Diagram 1 below.

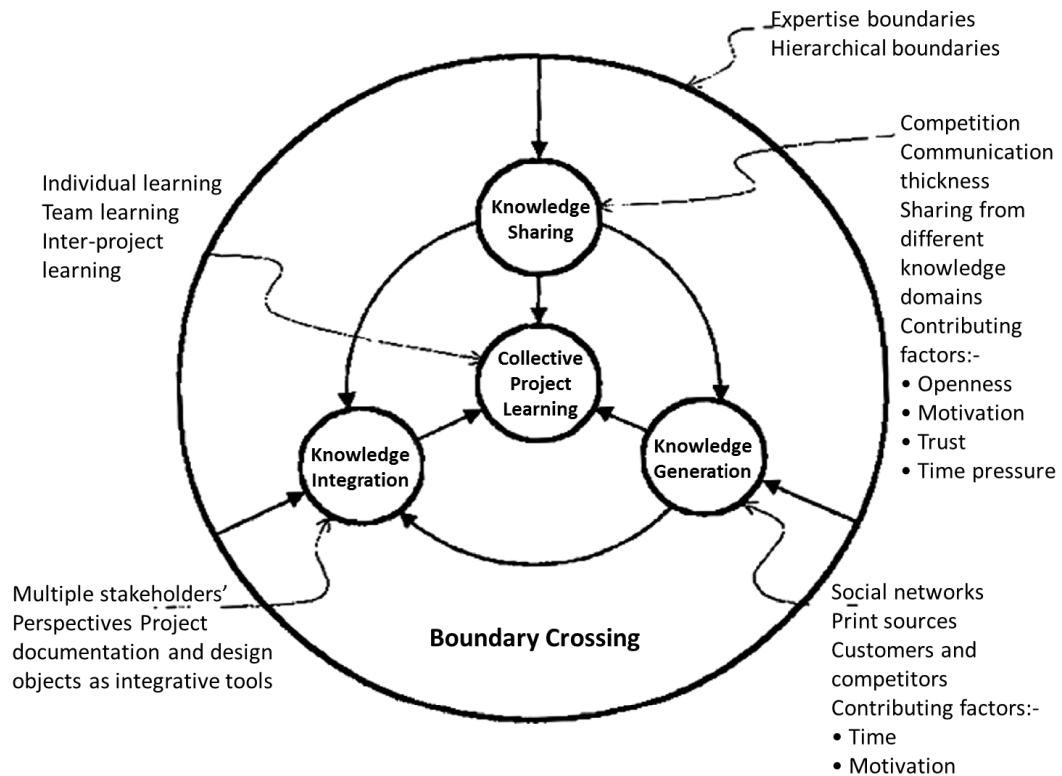


Diagram 1: The interrelationships between multidisciplinary knowledge creation processes (Fong 2003, p. 484).

What has not been evident in the literature is how this knowledge is then exchanged, and in particular, how project managers may exchange knowledge while working on a project.

## 2.6 Knowledge Environment

The environments in which project management knowledge is acquired and exchanged will be reviewed through the physical environment and the virtual environment. I will also explore the barriers and enhancers to project managers being able to acquire and exchange knowledge in these environments. The exchange of knowledge occurs in a physical or virtual environment and according to Eraut (2004) requires five agreements:

1. 'The extraction of potentially relevant knowledge from the context(s) of its acquisition and previous use.
2. Understanding the new situation—a process depending on informal social learning.
3. Recognising what knowledge and skills are relevant.
4. Transforming them to fit the new situation.
5. Integrating them with other knowledge and skills in order to think/act/communicate in the new situation' (Eraut 2004, p. 256).

In establishing an appropriate environment for knowledge to be acquired and exchanged, a project manager needs ‘... to determine if the team will meet and operate on a face-to-face basis or in a virtual environment; whether they will be located in one or multiple time zones; whether they will use multiple languages for communication’ (Project Management Institute 2013, p. 293), and consider the impact of organisational culture, structure and the political climate. I have focused this review on the physical and virtual environments and not the cultural or political aspects of the space where project work occurs ‘... due to the diversity in norms, backgrounds, and expectations of the people involved with a project’ (Project Management Institute 2013, p. 516).

### **2.6.1 The Physical Environment**

The range of locations where a project manager may conduct his or her work is varied. Project work is dynamic and often leads to temporary physical environments, such as construction sites, IT testing laboratories or different offices and are managed through temporary organisations. These ‘adhocracies’ Einsiedel (1987), or structureless organisations where problems can be solved, adapt ‘... to the environment based on a given goal’ (Nonaka, Toyama & Konno 2000, p. 6). For the purposes of this review I will focus on the internal physical environment of the adhocracy where project work occurs, not the organisation’s external environment.

The individual working at either a micro or macro level in an organisation ‘... influences and is influenced by the environment ... with which he or she interacts’ (Nonaka, Toyama & Konno 2000, p. 8). This environment, defined by Nonaka, Toyama and Konno (2000) as *ba* ‘... transcends the boundary between micro and macro’ (Nonaka, Toyama & Konno 2000, p. 19) and ‘... alludes to Heidegger’s notion of time-space as being perhaps of similar nature, but does not elaborate further on this point’ (Gueldenberg & Helting 2007, p. 111). The space, or *ba*, where an individual carries out their work creates an evolving and flexible environment in which to acquire and exchange knowledge. These environments have unpredictable variables which may affect project efficiency and success if the project manager is not aware of specific nuances.

### **2.6.2 The Virtual Environment**

Virtual collaborative environments can facilitate *ba* (Nonaka, Toyama & Konno 2000, p. 17) to create a systematic approach to project work through the use of information technology. Online portals such as the Internet, email, webpages, and digital diaries will be reviewed to



identify if these vehicles offer an appropriate medium for the acquisition and exchange of knowledge. The structure of these virtual environments may try to emulate the physical environment. In doing so, protocols need to be established to ensure the project manager understands what the expectations are when working in this environment.

A postgraduate program delivering a web-based interactive online project management course was described by Sankaran and Kaebnick (2005) as being '... extremely successful ... and feedback from students clearly indicates that they have obtained additional knowledge and skills that will be of value in their current position' (2005, p. 9). There were several challenges mirrored in the physical project environment, including: diverse backgrounds; project manager experience; class modes; time zones and nature of work; different cultural and language backgrounds; technology; and participation. Lee and McLoughlin (2007) have been investigating the potential limitations of '... the one-way flow of information between teacher (as expert) and student (as novice)' (Lee & McLoughlin 2007, p. 21). They have found this environment is being replaced by a more creative, collaborative space producing shared outcomes. The novice can become immersed in a virtual environment encouraging '... informal conversation, dialogue, collaborative content generation, and the sharing of information' (Lee & McLoughlin 2007, p. 21). However, the recommendations from the study are virtual environments need to '... supply support and scaffolding for learning and reflection within the authentic, real world contexts in which knowledge construction naturally occurs' (Lee & McLoughlin 2007, p. 23).

The delivery of online learning is also seen as a favourable way in which to exchange knowledge between the academic and students. Hase (2009) describes some of the challenges this will bring, including a:

*'... flexible, changing curriculum driven by the learning itself, ... [the] assessment needs to be flexible and negotiated ... [and] the educator needs to be able to identify when the learner has reached this level of sophistication, be prepared to relinquish control, and then negotiate new learning and assessment strategies depending on the direction in which the learner is heading' (Hase 2009, p. 48).*

The advent of virtual project teams, facilitated by the advances in technology, with concomitant reduction in the effect of distance and time differences, and the increase in cross cultural work, can affect the project manager's ability to exchange knowledge. The definition of a virtual team is '... a team [of people] that has a common purpose that use technology to cross time zones, distance and the boundaries of organizations' (Lipnack & Stamps 1999, p.

17). A virtual team has three facets to deliver on the project: 1. Purpose; 2. People; and 3. Links, or connections with defined processes connecting inputs and outputs. This is described in Table 5 below.

*Table 5: Virtual team principles (Lipnack & Stamps 1999, p. 19)*

Facets	Input	Processes	Outputs
People	Independent members	Shared leadership	Integrated levels
Purpose	Cooperative goals	Interdependent tasks	Concrete Results
Links	Multiple Media	Boundary-crossing interactions	Trusting relationships

### **2.6.3 Barriers and Enhancers to Knowledge Exchange**

The identification of barriers and enhancers in the project environment gives a project manager a map to negotiate and develop boundaries to manage the risks and opportunities associated with the acquisition and exchange of knowledge. Hase, Sankaran and Davies (2006) describe how to overcome the nontechnical barriers when managing knowledge in an organisation. The outcomes of their study were the result of an investigation into the compromised functioning of an organisation. The lack of knowledge was the direct result of an individual who sought to maintain power and control by blocking knowledge to co-workers. The organisational characteristics leading to this abuse of power were identified in a case study by Hase et al. (2006, pp. 37-8) as: 1. lack of executive support; 2. not having the active support of identified knowledge champions; and 3. misunderstanding of the value of knowledge management. The study establishes a process to elicit issues from people through a series of workshops, and transparent recording and grouping of issues. The facilitator allowed the participants to share in the ownership, and solutions to, the issues identified. This affords a structured process to minimise the potential for abusive behaviour resulting in a dysfunctional organisation.

A study of 431 U.S. and European organisations by Ruggles (1998) found the ‘... biggest impediments to knowledge transfer in their organization... was culture’ (Ruggles 1998, p. 86). In the same year O’Dell and Jackson Grayson (1998) conducted a study of three organisations and found three key areas why knowledge was not transferred. These barriers were identified in order of priority as:

1. *Ignorance*: on the side of both the “source” and the “recipient” who did not know the knowledge existed or that other people would be interested in the knowledge.
2. *Absorptive capacity of the recipient*: Even if a manager knew about the better practice, he or she may have had neither the resources (time or money) nor enough practical detail to implement it.
3. *Lack of a relationship between the source and the recipient of knowledge*: the absence of a personal tie, credible and strong enough to justify listening to or helping each other’ (O’Dell & Jackson Grayson 1998, p. 155).

Further work done by Pfeffer and Sutton (2000) proposed the following reasons why a gap existed between knowing and doing:

- ‘Knowledge management efforts mostly emphasize technology and the transfer of codified information.
- Knowledge management tends to treat knowledge as a tangible thing, as a stock or a quantity, and therefore separates knowledge as something from the use of that thing.
- Formal systems can't easily store or transfer tacit knowledge.
- The people responsible for transferring and implementing knowledge management frequently don't understand the actual work being documented.
- Knowledge management tends to focus on specific practices and ignore the importance of philosophy’ (Pfeffer & Sutton 2000, p. 93).

To reduce the barriers to knowledge exchange Hatcher and O’Connor (2009) propose five key themes supporting the transfer of individual learning from an educational to a work environment. The themes are:

- ‘Strategic thinking.
- Being self-aware and using communication effectively.
- Desire for Organisational improvement.
- Personal Confidence in and critical reflection on decision making.
- Sense of respect from the organisation’ (Hatcher & O’Connor 2009, p. 14).

Similarly, O’Dell and Jackson Grayson (1998) found ‘... most people have a natural desire to learn, to share what they know, and to make things better’ (1998, p. 157). To facilitate knowledge exchange the following logistical, structural, and cultural areas need to be addressed:

- Identify a common purpose and common fate to minimise organisational barriers.

- Value knowledge sharing over personal technical expertise and knowledge creation.
- Create opportunities for contact, relationships, and common perspectives among people who don't work side by side.
- Recognise and capture tacit knowledge.
- Build knowledge sharing into work practices by allowing time and offering rewards.

In some organisations Davenport and Klahr (1998) suggest people need to be reminded that the systematic exchange of knowledge is designed ‘... to augment human knowledge, and not to replace it’ (1998, p. 206) so as to minimise the risk of sabotaging knowledge exchange initiatives and systems, for fear of losing their jobs. Typically, these studies have tended to focus on barriers to knowledge sharing, rather than enabling factors (Homburg & Meijer, 2001, p. 1).

To develop a structure to enhance knowledge exchange, O’Dell and Jackson Grayson (1998) found organisations need to ‘... address the barriers and create a supportive climate for transfer. The

enablers for transfer include technology, culture, leadership, and measurement’ (1998, p. 163). The study recommended the establishment of internal and external best practice benchmarks. These benchmarks can ‘... break established paradigms, create a readiness for action, and provide models of excellence’ (O’Dell & Jackson Grayson 1998, p. 156). In addition, support from leaders needed to be established and their behaviour possibly changed, to endorse and sustain the exchange of knowledge. O’Dell and Jackson Grayson (1998) suggest the following tactics used by leaders at Chevron to enhance knowledge exchange:

- Tie your initiatives to your vision.
- Have success stories told at each top-executive meeting.
- Remove the barriers to progress (e.g., the not-invented-here syndrome, not looking for new ideas).
- Reinforce and reward positive behaviours and promote the right people.
- Lead by example, show commitment to learning through action, and get upward feedback on how you are doing.
- Tell employee groups that the most important thing is to share and use best practices.
- Apply these approaches to the total corporation’ (O’Dell & Jackson Grayson 1998, p. 169).

A research study undertaken by Faraj and Sproull (2000) identified factors enhancing the ability of an organisation to create a supportive environment to exchange knowledge. The research focused on the coordination of individuals who brought expertise in the form of specialist skills and knowledge to a project team. The potential for communication breakdowns and conflict were addressed by developing a framework aimed at ‘... managing resources and expertise dependencies’ (Faraj & Sproull 2000, p. 1555). At a team level the ability to ‘... develop a common language for describing tasks, assignments, roles, and location of expertise’ (Faraj & Sproull 2000, p. 1556) can assist in breaking down the barriers of understanding and exchanging knowledge which could lead to enhanced performance. A similar outcome was found in a study conducted by Collins and Smith (2006) where ‘... commitment-based HR practices ... related to the social climates of trust, cooperation, and shared codes and language [facilitated] exchange’ (2006, p. 557). The frequency of exchange also ‘... facilitates transferring tacit knowledge in customized exchanges, especially for specialized processes or knowledge’ (Jones, Hesterly & Borgatti 1997, p. 917).

## ***2.7 Knowledge Drivers***

To drive knowledge acquisition and exchange in an organisation, an exploration of the personality, motivation and behaviours may assist in understanding these influencers. The key learning approaches, including an examination of learning styles, experiential learning, and social learning will underpin the discussion on the context of where knowledge acquisition and exchange occurs, and areas for further research beyond the scope of this review. The desire to develop skills and competency are reviewed as an extension to the section where project management competency was examined earlier in this chapter.

### **2.7.1 Personality, Motivation, and Behaviour**

What drives a project manager to acquire and exchange knowledge needs to be understood through a review of the literature, to assist in understanding the role of an individual working in a team. This will establish a context and *raison d'être* to establish direction and boundaries to shape how project managers perform their work. The review focused on an individual's attributes which may be driven by personality, motivation and behaviours. The capacity of a project manager to acquire and exchange knowledge may not follow the rules or models described, but may be more intuitive, subtle, and nuanced. This may lead into further investigations, outside of this study, into other factors, such as emotional acumen impacting on the ability of a project manager to acquire and exchange knowledge.

## The Influence of Personality on Knowledge Exchange

To understand the influence of personality on how project managers exchange knowledge, a definition of personality is ‘... all the constitutional, mental, emotional, social, etc., characteristics of an individual’ (The Macquarie Dictionary 2009, p. 1271). The theories of personality includes the study of: traits (Goldberg 1993); types (Myers Briggs & Myers 1995); psychoanalysis (Freud 1923); behaviour (Ajzen 1987); social cognition (Bandura & Walters 1963); and humanistic psychology (Maslow 1987). This vast body of literature is refined to include several theorists and their work as it relates to the acquisition and exchange of knowledge.

The work by Freud (1923) on the three part human psyche of the ‘id’, the ‘ego’ and the ‘super-ego’ defines an individual’s responses to various internal situations. The ‘id’ refers to the principle of child-like pleasure without consequences, the ‘ego’ refers to the beginnings of ‘censorship and reality testing’ (1923, p. xv), and the ‘super-ego’ represents an ability to identify with conscious thought.

Maslow (1987) suggests in his theory of ‘Implications of Gratification’ (1987, p. 41) that personality can be classified in a holistic way as each person can be compared against another according to the satisfaction of their similar needs. These needs can be classified according to how a person will behave in certain circumstances.

Classifying personality into five distinguishable but separate factors was described by McDougall (1932) as ‘... intellect, character, temperament, disposition and temper’ (McDougall 1932, p. 10). These five factors have been organised and described by Barrick and Mount (1991, p. 1) and Goldberg (1993, p. 27) into the following Table 6 to depict positive and negative characteristics.

*Table 6: Five personality types adapted from Goldberg (1993) and Barrick and Mount (1991)*

<b>Factor</b>	<b>Positive Characteristics</b>	<b>Negative Characteristics</b>
Surgency [sic] or extraversion	Sociable, talkative, activity level, and assertive	Silence, passivity, and reserved
Agreeableness or pleasantness	Good-natured, kind, warm, cooperative, and trusting	Hostility, selfishness, and distrust
Conscientiousness or dependability	Responsible, dependable, organised, thorough, reliable, persistent, and achievement oriented	Carelessness, negligence, and unreliability
Emotional stability vs. neuroticism	Tense, moody, temperamental, insecure, and nervous	Placid, independent, emotionally stable, confident
Intellect or openness to experience	Imaginative, curious, artistically sensitive, and intellectual	Shallow and imperceptiveness

A personality inventory was developed by Briggs and her daughter Briggs Myers (1995) and was based on the thinking of Jung (published 1999). The way in which people view the world was described in terms of the awareness and perception ‘... of things, people, occurrences, and ideas’ (Myers Briggs & Myers 1995, p. 1). These four preferences identified how people made choices based on a dominant process.

## **Motivation to Exchange Knowledge**

The successful acquisition and exchange of knowledge could be attributed to how motivated a person is under different circumstances. To examine this assumption I reviewed the work done by several authors who undertook studies in human behaviour over the last century. A ‘Theory of Motivation’ (Maslow 1943) suggests people are driven by preparatory or consummatory behaviour defined by sequential needs, and extends earlier work by Freud (1923). The exchange or relinquishment of a portion of happiness for security is described by Freud (1923) in terms of the sacrifices people make to strive for a civilized way of life. To address this pursuit Maslow (1943) developed a ‘Hierarchy of Needs’, depicting conscious or unconscious motivations that are ‘... typically an act [that] has more than one motivation’ (Maslow 1943, p. 1). However, it has been suggested Maslow’s work ‘... suffer[s] from vagueness in concept, looseness in language, and lack of adequate empirical evidence’ (Wahba & Bridwell 1976, p.

233). Alternative views of motivation include McClelland (1961, pp. 37,8), who describes the basis of Freud's (1923) view of motivation in terms of 'Psychoanalytic Theory'. This theory is based on the belief people are unconsciously motivated by the need to survive or avoid being destroyed. Another alternative theory to describe what motivates people was developed by Alderfer (1969) which resulted in the identification of three levels of need: Existence; Relatedness; and Growth, known as the 'ERG Theory'.

The capacity of a person to acquire and exchange knowledge is described by Maslow (1987) in terms of the basic cognitive desire '... to satisfy curiosity, to know, to explain, and to understand' (1987, p. 23). These basic needs are, according to Maslow (1987), measured in degrees of satisfaction, the level of consciousness a person has of their needs, the impact of culture, multiple motivations of behaviour, unmotivated behaviour, threatening environments, gratification and functional autonomy. However, '... the most problematic aspect of Maslow's theory ... is that dealing with the concept of need itself' (Wahba & Bridwell 1976, p. 234). Herzberg (1987) was studying professionals at the same time to develop a motivation-hygiene theory identifying distinct factors contributing to job satisfaction, or motivation, and dissatisfaction. The factors resulted in employees being unmotivated were pain avoidance either consciously, through learned behaviours, or unconscious. Using these factors to potentially motivate project managers requires an understanding of what Hertzberg describes as the 'eternal triangle' (1987, p. 113). To encourage the appropriate attitude for employees, which is hoped will lead to increased efficiencies, Herzberg (1987) suggests a working environment to balance this triangle of organisational theory, industrial engineering and behavioural science. To motivate employees Hertzberg suggests 'vertical job loading' is undertaken which provides the employee with an opportunity to grow and learn through the introduction of '... new and more difficult tasks not previously handled' (Herzberg 1987, p. 114).

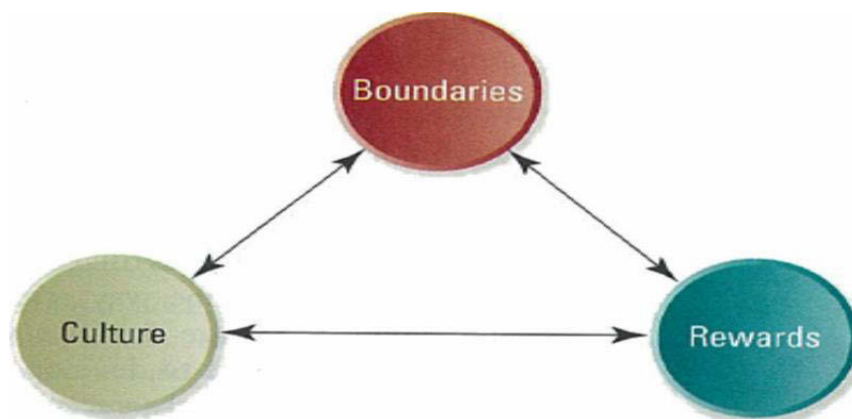
In a study on how organisations motivate employees to exchange knowledge, O'Dell and Jackson Grayson (1998) found if the practice of knowledge exchange assisted employees with their work, they would share information. The study also suggests '... rewards and recognition may be healthy and useful in the early stages of building enthusiasm for exchange. However, in the long run and for a sustainable effort, employees have to find the work itself rewarding' (O'Dell & Jackson Grayson 1998, p. 169). Boisot and Griffiths (1999) suggest '... the capture of knowledge involves more than simply making it easier for employees to articulate their idiosyncratic experiences and know how. It involves creating an incentive structure making it worth their while to do so' (1999, p. 662). These incentives are described by Hall (2001) in



terms of explicit rewards in the form of economic rewards, access to information and knowledge or soft rewards such as enhanced reputation and personal satisfaction.

## Behaviour

How behaviour drives the acquisition and exchange of knowledge can be based initially on the definition of behaviour, as a '... 1. Matter of behaving or acting, [and] 2. The actions or activities of the individual as matters of psychological study' (The Macquarie Dictionary 2009, p. 149). The 'Essential Elements of Behavioural Control' proposed by Dess, Lumpkin and Eisner (2010) suggest '... leaders in an organisation, specially the new comers, should know the organisational culture, boundaries and understand what are the rewards or consequences' (Dess, Lumpkin & Eisner 2010, p. 317). The relationship between these cultures, boundaries and rewards are shown in Figure 4 below.



*Figure 4: Essential elements of behavioural control (Dess, Lumpkin & Eisner 2010, p. 317)*

The factors motivating individual and group behaviours to exchange knowledge are different and can influence '... a knowledge-intensive culture by encouraging and aggregating behaviors such as knowledge sharing (as opposed to hoarding) and pro-actively seeking and offering knowledge' (Cohen 1998, p. 27). When observing the dynamics of team failure, Belbin and his colleagues at Henley Management College (Belbin 2010) identified intrinsic behaviours to be avoided. A diagnostic tool was developed for team members to identify team roles, with the success of the team dependent on balancing strengths and allowable weaknesses of each role.

## 2.7.2 Learning Approaches

The various learning approaches can have an impact on the ability of a project manager to acquire and exchange knowledge. I will introduce several learning styles and experiential and social learning dynamics to frame how a project manager may assimilate new knowledge to understand knowledge acquisition and exchange. The research does not aim to uncover if the exchange results in a learning outcome, however understanding these learning concepts may generate a framework where the acquisition and exchange of knowledge influences learning.

### Learning Styles

A project manager will need to focus on the development of the individuals in a project team to deliver outcomes for the client, according to the project brief. To effectively develop a project team, the project manager needs to understand; goal-setting strategies; conflict management; decision making; communications management; how to avoid group think; and practice reflection (Leigh & Leigh 1997). The work done by Honey and Mumford (1986) on developing people in the workplace, identifies what influences effective learning. They defined learning in terms of a manager being able to demonstrate they had learnt something not previously known. The use of a 'Learning Styles Questionnaire' developed by Honey and Mumford (1986) establishes a framework to assist people in identifying four learning styles. These four learning styles define a person can learn as an activist, a reflector, a theorist, or a pragmatist. Honey and Mumford (1986) suggest to obtain the maximum benefit from any given situation, a person needs to select learning opportunities to fit their identified learning style, and work within the strengths and weaknesses of that learning style.

Davey et al. (2002) identified four 'Learning Style Themes' when teaching undergraduate students in a New Zealand university. The four themes suggested the students learnt by 1. doing, 2. rehearsing, 3. addressing individualism, and 4. laddering activities to manage expectations. Work related skills were developed and the group identified additional learning sub-themes including collective synergies, individualism and group dynamics. This type of learning can be described as action learning, which according to Yorks et al. (1999) is:

*'An approach to working with and developing people that use work on an actual project or problem as the way to learn. Participants work in small groups to take action to solve their problem and learn how to learn from that action. Often a learning coach works with the group in order to help the members learn how to balance their work with the learning from that work' (Yorks, O'Neil & Marsick 1999, p. 3).*

## Experiential Learning

The broad concept of learning through experience is people learn in an ongoing cyclical way to form new ideas. The processes supporting this experiential learning cycle, as stated by Kolb (1984), and based on the early pioneering work of Lewin (1938) and Dewey (1938), follows several propositions:

- 'Learning is best conceived as a process, rather than in terms of outcomes.
- Learning is a continuous process grounded in experience.
- The process of learning requires the resolution of conflicts between opposite modes of adaption to the world.
- Learning is an holistic process of adaption to the world.
- Learning involves transaction between the person and the environment.
- Learning is the process of creating knowledge' (Kolb 1984, pp. 26-37).

Kolb's experiential learning cycle (1984) moves from abstract conceptualisation to active experimentation, on to concrete experience, and then to observation and reflection. This cycle can be entered into at any point and has no definite conclusion, as seen in Figure 5 below.

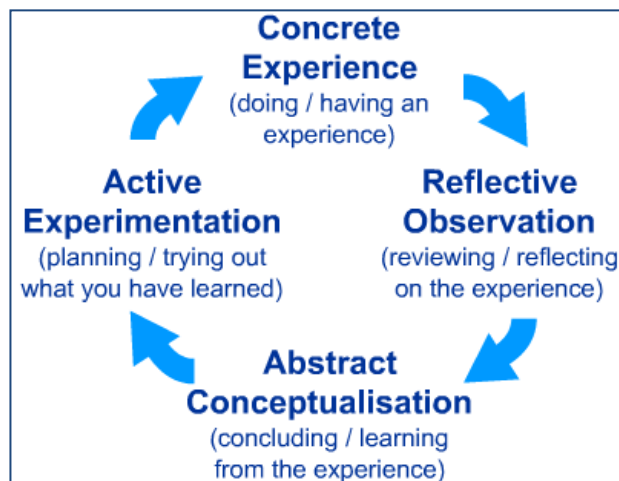


Figure 5: Kolb's experiential learning cycle (1984)

The development of this learning cycle was influenced by the work of Dewey (1938), Lewin (1952), and Piaget (1971). Dewey (1938) was known as progressive in his approach to education and stated '... there is an intimate and necessary relation between the processes of actual experience and education' (1938, p. 20). Lewin (1952), focused on how social problems could be addressed using scientific enquiry. This approach was based on developing theory from practice, and his work with organisations on planned interventions to create change is seen as the foundation of action research. Piaget (1971) described how the nature of

intelligence is shaped by the experiences of the individual in their environment. The studies by Boud, Cohen and Walker (1993) identified several assumptions on how people learn from experience. These assumptions include:

- ‘Experience is the foundation of, and the stimulus for, learning.
- Learners actively construct their own experience.
- Learning is a holistic process.
- Learning is socially and culturally constructed.
- Learning is influenced by the socio-emotional context in which it occurs’ (as cited in Andresen, Boud & Cohen 1995, p. 225).

An Australian university applies experiential learning to postgraduate students studying project management, where they are asked to participate collaboratively and then reflect individually on the lessons learnt. This form of cognitive apprenticeship ‘... supports learning in a domain by enabling students to acquire, develop and use cognitive tools in authentic domain activity’ (Brown, Collins & Duguid 1989, p. 39). It also allows students to learn within boundaries that are ‘... firmly set by the task, culture and history of the community’ (Nonaka, Toyama & Konno 2000, p. 15). The experiential learning cycle the student uses links an abstract concept to an active experiment, thus providing a concrete experience and then an opportunity to reflect (Kolb 1984). To transition through this cycle the student or intern may undergo what Brace-Govan and Powell (2005) adapted from Sweitzer and King (1999) define as ‘The Five Stages of Internship’, as listed in Table 7 below. The internship model is covered in more detail in ‘Chapter 2: Literature Review, Section 2.4 Knowledge Acquisition’.

*Table 7: The five stages of internship (Brace-Govan & Powell 2005, p. 127)*

<b>Stage</b>	<b>Activity</b>
1. Anticipation	Introduction to the Project; Initial Communication
2. Disillusion	Problem Identification; Task Requirements
3. Confrontation	Problem Solving; Seek help/ support/ in Problem Solving
4. Competence	Knowledge Sharing; Transfer of Expertise; Mentor Input
5. Culmination	Outcomes; Evaluation

It is the role of an academic to bring ‘... subjective and experiential knowledge balanced by objective and instrumental input’ (Cicmil & Hodgson 2007, p. 18) to demonstrate not only how to ‘do’ project management but more importantly how to reflect and improve practice.

This raises two key issues: first the nature of the knowledge underpinning project management as an academic subject, and second the appropriate curriculum design and organisation of project management courses. The early work by Dewey (1938) was based on ‘... the belief that all genuine education comes about through experience does not mean that all experiences are genuinely or equally educative’ (Dewey 1938, p. 25).

## **Social Learning**

The accepted view of social learning is ‘... organizational participants learn how to behave from observing those around them’ (Davis & Luthans 1980, p. 284). This may occur ‘... within or by a group, an organisation, or any cultural cluster’ (Warne, Ali & Pascoe 2003, p. 4) at different times and in a range of work situations.

Social learning is based on using models as a ‘... source for learning new behaviors and for accomplishing behavioral change in organizational settings’ (Sims & Manz 1982, p. 62). The work of Bandura (1969, 1977) suggests ‘... most human behavior is learned observationally through modelling: from observing others one forms an idea of how new behaviors are performed, and on later occasions this coded information serves as a guide for action’ (Bandura 1977, p. 22).

A four year research study by the Australian Defence Force (Warne, Ali & Pascoe 2003) investigated 'social learning' in three settings to identify effective processes and strategies contributing to the sharing and retention of corporate knowledge within organisations. The ‘... social learning constructs resulting from this study included:

- Organisational Culture—comprising enculturation and organisational communication climate;
- Job Satisfaction and Morale—comprising conditions of service, recognition and reward, organisational loyalty to workers, workplace design, job significance, performance management and employee loyalty to the organisation;
- Information, Knowledge and Support—comprising availability of information, sharing of information, information flows, records keeping, personal networking, problem-solving, reflection and enquiry, bridging agents, organisational perceptions, bricolage (informal improvisation from a variety of available sources), systems thinking, and IT infrastructure;
- Team Building—comprising leadership, goal alignment, communication climate, and performance management; and

- Professional Development—comprising induction, mentoring and buddying, peer review, and career management’ (Warne, Ali & Pascoe 2003, p. 58).

### 2.7.3 Skill and Competency

In this section I will further explore skill and competency as a driver to knowledge acquisition and exchange, having also addressed the assessment of project management competency in Section 2.2.2. The following Table 8 describes the differences between the two terms – skill and competency:

*Table 8: Definitions of skill and competence*

Skill	Competence
<p>‘The ability that comes from knowledge, practice, aptitude, etc., to do something well [and] competent excellence in performance; expertness; dexterity’ (The Macquarie Dictionary 2009, p. 1542).</p> <p>‘No skill can be considered learned until you can do it without thinking about it’ (Flower 1999, p. 65), including ‘... what kind of skills and competencies are relevant to complexities of project arrangements’ (Cicmil et al. 2006, p. 678).</p>	<p>‘The quality of being competent; adequacy; due qualification or capacity’ (The Macquarie Dictionary 2009, p. 352).</p> <p>Competencies are ‘... individual and measurable skills demonstrated and assessed against agreed standards of competence’ (Cairns 2000, p. 2). These standards describe ‘... performance criteria for workplace performance’ (Crawford et al. 2006, p. 723).</p>

The link between skill, or an ability, and competency, a standard to measure skill against, is represented by the four phases of competency described by Flower (1999, p. 64), which are:

1. ‘Unconscious incompetence: you do not know how little you know, and express this as “This is no big deal, it's just like ...”
2. Conscious incompetence: you realize how little you know, and express this as “This is impossible. I will never learn this ...”
3. Conscious competence: you know what you need to know, and express this as “Step 1, Step 2” or equivalent phrases verbally or cognitively
4. Unconscious competence: you “just do it” without thinking or verbalising an action’ (Flower 1999, p. 64) .

The parallel between skill and competency and the phases suggested by Flower (1999) can be seen in the work by Puccio & Gonzalez (2004) in Diagram 2 below which is based on Osborne's (1953) six steps of Creative Problem Solving (CPS). These six steps are 1. Objective Finding; 2. Data Finding; 3. Problem Finding; 4. Idea Finding; 5. Solution Finding; and 6. Acceptance Finding.

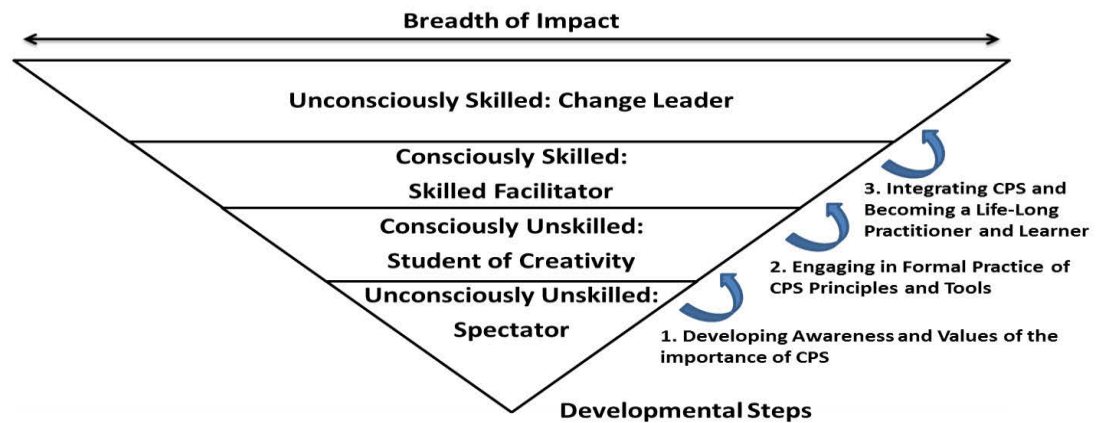


Diagram 2: A model for developing creative change leaders (Puccio & Gonzalez 2004, p. 406)

The learner can be seen to develop sequentially from the unconsciously unskilled spectator, and as knowledge is gained to the consciously unskilled student, on to the consciously skilled facilitator, and finally to the unconsciously skilled leader.

The levels of expertise, competence, and knowledge in project work and management can be linked to the reflective capability of the practitioner. The proficient performer possesses '... reflective understanding and participation in power relations' and the expert or virtuoso exhibits '... participative critical reflection over the intuition—the self and the group' (Cicmil et al. 2006, p. 680). Professional artistry or the '... competency practitioners display in unique, uncertain, and conflicted situations in practice' (Schön 1987, p. 13) relies on the ability of a project manager to recognise, judge, and then deliver, which is also referred to as reflection-in-action. Through developing reflective practices, the project manager can evolve into what Winter et al. (2006) described as a reflective project practitioner. These reflective practitioners possess multiple competencies, given the complexity of managing activity, people and plans when working on projects.

## 2.8 Summary

The literature review was undertaken to address my concerns that project managers are not effectively exchanging knowledge, and if they are it appears to be in an *ad hoc* manner, which

may lead to an intergenerational loss of project management knowledge. To review the literature within these research concerns, I focused on reviewing knowledge acquisition and knowledge exchange. These focus themes were complemented by exploring further the context in which knowledge acquisition and exchange occurred, and what the drivers were for this to occur. The literature themes were organised into clusters to generate a framework for the research to review the literature covering project management.

The management of project knowledge, as distinct from knowledge management, was examined before investigating the explicit and tacit components of knowledge acquisition. A definition of knowledge exchange was given, with a review of the impact on performance improvement and how knowledge conversion may occur. The physical and virtual knowledge environments were examined and barriers and enhancers to knowledge exchange were explored. Finally, the drivers behind knowledge acquisition and exchange were identified.

The review of the literature led to the initial development of two primary research questions: 1. How do project managers *acquire* project management knowledge? and 2. How do project managers *exchange* project management knowledge? A subsidiary research question was also initially prepared to identify what knowledge *sources* were used by project managers to *acquire* and *exchange* project management knowledge. To align with the literature I reframed the questions to focus specifically on four key themes identified from a review of the literature. These four questions address:

1. WHAT are the sources of knowledge? This leads to an examination of how project managers *acquire knowledge*.
2. HOW does knowledge exchange happen? This leads to an examination of how project managers *exchange knowledge*.
3. WHERE does knowledge exchange happen? This leads to an examination of the project management *environment*.
4. WHO makes knowledge exchange happen? This leads to an examination of what *drives* knowledge exchange.

These questions form the foundation for the research, framing the research methodology and methods in Chapter 3, the collection and analysis of the data in Chapter 4, the research discussion in Chapter 5, and the conclusions and implications in Chapter 6.



## 2.9 Appendices

### Appendix 1–Project Management Methodologies

Project Management Methodology	Description
Project Management Body of Knowledge, referred to as the PMBOK® Guide (Project Management Institute 2013).	The PMBOK® Guide, now in its 5th edition, was first published in 1996 by the Project Management Institute (PMI) and describes a set of standard project management terms, processes and knowledge areas. The processes describe how a project is: initiated; planned; executed; monitored and controlled; and closed. The knowledge areas define a project according to the elements of: scope; time; cost; quality; human resources; communications; risk; procurement; stakeholder management; and integration. During the management of a project, the PMBOK® Guide (Project Management Institute 2013) offers an outline for the: inputs; tools and techniques; and outputs for the ten knowledge areas.
Projects IN Controlled Environments 2 (PRINCE2)	The basis of the PRINCE2 method was developed by the UK Government in 1989 for Information Technology projects, and was further developed into a generic project management method in 1996. The PRINCE2 method is based on seven processes describing a project in terms of: start up; initiation; direction; controlling stages; managing stage boundaries; managing product delivery; and project closure. The techniques described in the PRINCE2 method include: product based planning; change control; and quality review. Within these processes the PRINCE2 method espouses principles including the: business case; organisation; quality; plans; risk; and change progress. In addition, themes cover: continued business justification; learning from experience; defined roles and responsibilities; manage by stages; manage by exception; focus on products; and tailor to suit the project environment.

Project Management Methodology	Description
Logical Framework Approach (LFA)	<p>The Logical Framework Approach (LFA) project method introduced in 1969 for the United States Agency for International Development to design, monitor and evaluate international development projects. To measure the progress of a project, the Logframe relies on a 'temporal logic model' which requires the project manager to first identify then connect project classifications. These project classifications include the Description; Objectively Verifiable Indicators (OVI); Means of Verification (MoV) based on the OVIs; and positive or negative assumptions according to the project's goal, purpose, outputs, and activities.</p>
Agile Project Management	<p>The Agile project management method evolved in the 1990s from a reaction against highly regulated software development project management methods from the 1970s such as the Waterfall Development Model. The Agile method relies on collaboration between cross functional teams that self-organise to rapidly respond to change when determining requirements for software development and engineering projects. This method is iterative and requires a flexible approach to overlap project phases when deliverables have been completed, often in very short timeframes. In direct contrast, the Waterfall Development Model, adapted from the manufacturing and construction industries, follows a sequential order of project phases where each preceding phase must be completed before moving to the next phase.</p>

## Appendix 2–Re-thinking Project Management–the five directions

Reproduced from Winter, Smith, Morris, and Cicmil (2006, p. 642).

### Theory *ABOUT* Practice

#### Direction 1

The life-cycle model of projects and PM	➡	Theories of the complexity of projects and PM
<p><b>From:</b> the simple lifecycle-based models of projects, as the dominant model of projects and project management.</p> <p>And <b>from:</b> the (often unexamined) assumption that the lifecycle model <i>is</i> (assumed to be) the actual 'terrain' (i.e. the actual reality 'out there' in the world).</p>		<p><b>Towards:</b> the development of new models and theories which recognise and illuminate the <i>complexity</i> of projects and project management, at all levels.</p> <p>And <b>towards:</b> new models and theories which are explicitly presented as only <i>partial</i> theories of the complex 'terrain'.</p>

#### Implication

The need for *multiple images* to inform and guide action at all levels in the management of projects, rather than just the classical lifecycle model of project management, as *the* main guide to action, (with all its codified knowledge and techniques). Note: theories ABOUT practice can also be used as theories FOR practice.

### Theory *FOR* Practice

#### Direction 2

Projects as Instrumental Processes	➡	Projects as Social Processes
<p><b>From:</b> the instrumental lifecycle image of projects as a linear sequence of tasks to be performed on an objective entity 'out there', using codified knowledge, procedures and techniques, and based on an image of projects as temporary apolitical production processes.</p>		<p><b>Towards:</b> concepts and images which focus on social interaction among people, illuminating: the flux of events and human action, and the framing of projects (and the profession) with an array of social agenda, practices, stakeholder relations, politics and power.</p>

#### Direction 3

Product Creation as the Prime Focus	➡	Value Creation as the Prime Focus
<p><b>From:</b> concepts and methodologies which focus on: <i>product creation</i> – the temporary production, development, or improvement of a physical product, system or facility etc – and monitored and controlled against specification (quality), cost and time.</p>		<p><b>Towards:</b> concepts and frameworks which focus on: <i>value creation</i> as the prime focus of projects, programmes and portfolios. Note however: 'value' and 'benefit' as having multiple meanings linked to different purposes: organisational and individual.</p>

#### Direction 4

Narrow Conceptualisation of Projects	➡	Broader Conceptualisation of Projects
<p><b>From:</b> concepts and methodologies which are based on: the narrow conceptualisation that projects start from a well-defined objective 'given' at the start, and are named and framed around single disciplines, eg. IT projects, construction projects, HR projects etc.</p>		<p><b>Towards:</b> concepts and approaches which facilitate: broader and ongoing conceptualisation of projects as being multidisciplinary, having multiple purposes, not always pre-defined, but permeable, contestable and open to renegotiation throughout.</p>

**Theory *IN* Practice**

**Direction 5**

<b>Practitioners as Trained Technicians</b>	<b>Practitioners as Reflective Practitioners</b>
<p><b>From:</b> training and development which produces: practitioners who can follow detailed procedures and techniques, prescribed by project management methods and tools, which embody some or all of the ideas and assumptions of the 'from' parts of 1 to 4.</p>	<p><b>Towards:</b> learning and development which facilitates: the development of reflective practitioners who can learn, operate and adapt effectively in complex project environments, through experience, intuition and the pragmatic application of theory in practice.</p>

## **Appendix 3–Technical Project Management Qualifications**

Reproduced from the Australian Qualifications Framework (2010, pp. 15-8).

### **Certificate IV**

- A Certificate IV follows secondary school education and can be completed between six months and two years.
- This qualification is designed to qualify individuals who apply a broad range of specialised knowledge and skills in varied contexts to enter skilled work and/or as a pathway for further learning.
- Graduates of the qualification type will have broad and integrated factual, technical and theoretical knowledge in a specialised field of work and learning.
- Apply knowledge and skills:
  - to specialised tasks or functions in known or changing contexts;
  - with responsibility for own functions and outputs, and can have limited organisation of others; and
  - with limited responsibility for the quantity and quality of the output.

### **Diploma**

- A Diploma follows secondary school education or a Certificate IV and can be completed between one and two years.
- This qualification is designed to qualify individuals who apply integrated technical and theoretical concepts in a broad range of contexts to enter advanced skilled or paraprofessional work and/or as a pathway for further learning.
- Graduates of the qualification type will have knowledge integrating technical and theoretical concepts, with depth in some areas within a field and a broad knowledge of related fields of work and learning.
- Apply knowledge and skills:
  - with depth in some areas of specialisation, in known or changing contexts;
  - to transfer and apply theoretical concepts and/or technical and/or creative skills in a range of situations;
  - with personal responsibility and autonomy in performing complex technical operations with responsibility for own outputs in relation to broad parameters for quantity and quality; and

- by applying initiative and judgement to organise the work of self and others and plan, coordinate and evaluate the work of teams within broad but generally well defined parameters.

### **Advanced Diploma**

- An Advanced Diploma follows a Diploma and can be completed between in one and a half to two years.
- This qualification is designed to qualify individuals who apply specialised knowledge in a range of contexts to enter advanced skilled or paraprofessional work and/or as a pathway for further learning.
- Graduates of the qualification type will have specialised technical and theoretical knowledge with depth within one or more fields of work and learning.
- Apply knowledge and skills:
  - with depth in areas of specialisation, in contexts subject to change;
  - to apply a range of fundamental principles and complex techniques to known and unknown situations;
  - to apply initiative and judgment in planning, design, technical or management functions with some direction; and
  - across a broad range of technical or management functions with accountability for personal outputs and personal and team outcomes within broad parameters.

## **Appendix 4–Higher Education Resulting in a Project Management Qualification**

Reproduced from the Australian Qualifications Framework (2010, pp. 15-8).

### **Bachelor Degree**

- A Bachelor Degree follows secondary school or TAFE education and can be completed in three to four years.
- This qualification is designed to qualify individuals who apply a broad and coherent body of knowledge in a range of contexts to enter professional work and/or as a pathway for further learning.
- Graduates of the qualification type will have a broad and coherent body of knowledge, with depth in the underlying principles and concepts in one or more disciplines as a basis for independent lifelong learning.
- Apply knowledge and skills:
  - using judgement and initiative in professional practice and/or scholarship;
  - to adapt knowledge and skills in diverse contexts; and
  - to take responsibility and accountability for own learning and professional practice and collaboration with others within broad parameters.

### **Graduate Certificate**

- A Graduate Certificate follows a Bachelor Degree or an associated Diploma and can be completed between six months and one year.
- This qualification is designed to qualify individuals who apply a body of knowledge in a range of contexts for professional or highly skilled work and/or as a pathway for further learning.
- Graduates of the qualification type will have specialised knowledge within a systematic and coherent body of knowledge that may include the acquisition and application of knowledge and skills in a new or existing discipline or professional area.
- Apply knowledge and skills:
  - to make high level, independent judgements in a range of technical or management functions in varied specialised contexts;
  - to initiate, plan, implement and evaluate broad functions within varied specialised technical and/or creative contexts; and

- to demonstrate responsibility and accountability for personal outputs and all aspects of the work or function of others within broad parameters.

## **Graduate Diploma**

- A Graduate Diploma follows a Bachelor Degree or an associated Diploma and can be completed between one and two years.
- This qualification is designed to qualify individuals who apply a body of knowledge in a range of contexts for professional or highly skilled work and/or as a pathway for further learning.
- Graduates of the qualification type will have advanced knowledge within a systematic and coherent body of knowledge that may include the acquisition and application of knowledge and skills in a new or existing discipline or professional area.
- Apply knowledge and skills:
  - to make high level, independent judgements in a range of technical or management functions in varied specialised contexts;
  - to initiate, plan, implement and evaluate broad functions within varied specialised technical and/or creative contexts; and
  - to demonstrate responsibility and accountability for personal outputs and all aspects of the work or function of others within broad parameters.

## **Master's Degree**

- A Master's Degree follows a Bachelor Degree or an associated Graduate Certificate or Diploma and can be completed between one and two years.
- This qualification is designed to qualify individuals who apply an advanced body of knowledge in a range of contexts for professional practice or scholarship and/or as a pathway for further learning.
- Graduates of the qualification type will have a body of knowledge that includes the understanding of recent developments in a field of knowledge and/or area of professional practice.
- Apply knowledge and skills:
  - to demonstrate creativity and initiative in the application of knowledge and skills to new situations in professional practice and/or for further learning;
  - to demonstrate high level personal autonomy and accountability; and
  - to demonstrate the planning and execution of a substantial research based project, capstone experience or piece of scholarship.



## **Doctoral Degree**

- A Doctoral Degree follows a Master's or Honour's Degree and can be completed between three and four years.
- This qualification is designed to qualify individuals who apply a substantial body of knowledge to research, investigate and develop new knowledge, in one or more fields of investigation.
- Graduates of the qualification type will have a substantial body of knowledge at the frontier of a field of work or learning, including knowledge that constitutes an original contribution, and substantial knowledge of research principles and methods applicable to the field of work or learning.
- Apply knowledge and skills:
  - to demonstrate initiative and creativity in new situations and/or for further learning;
  - to demonstrate full responsibility and accountability for personal outputs;
  - to demonstrate the planning and execution of original research; and
  - to demonstrate the ongoing capacity to generate new knowledge.

## Appendix 5–Expertise, Competence and Knowledge in Project Work and Management

Reproduced from Cicmil, Williams, Thomas, and Hodgson (Cicmil et al. 2006, p. 680).

Level	Experience	Action based on...	Comment
<b>Novice</b>	Faces a given problem and a given situation in a given task area for the first time.	<ul style="list-style-type: none"> <li>• Instructions (training course, PMBOK® Guide).</li> <li>• Learning to recognise objective facts about and characteristics of the situation (models and definitions of project).</li> <li>• Learning rules of action, as generalized for all similar situations on the basis of identified facts, thus context-independent (project management methodology, procedures, best practice).</li> <li>• Evaluating the performance of the skills on the basis of how well the learned rules are followed.</li> </ul>	The rules are necessary for gaining initial experiences but they can quickly become a barrier to acquiring skills at higher levels.
<b>Advanced Beginner</b>	Achieves some real-life experience.	<ul style="list-style-type: none"> <li>• Learning to recognise relevant elements in relevant situations on the basis of their similarities with previous examples (typology of projects).</li> <li>• The context of experience becomes important and decisive in the choice of relevant elements, in addition to context-independent rules (learning from experience, limited reflection) PMBOK® trial-and-error.</li> </ul>	Personal experience via trial and error becomes more important than context-independent, verbally formulated facts and rules.

Level	Experience	Action based on...	Comment
<b>Competent Performer</b>	With more experience the number of recognizable elements and facts becomes overwhelming.	<ul style="list-style-type: none"> <li>• Learning from own experience and from others to prioritise elements of the situation.</li> <li>• Organizing information by choosing a goal and a plan.</li> <li>• Dealing only with a set of key factors relevant to the goal and plan, thus simplifying the task and obtaining improved results.</li> <li>• The choice of a certain goal and plan and the need to have a plan is paradoxical (simultaneous subjectivity and objectivity)—it is not unproblematic and requires deliberation, the relationship of involvement between performer and environment.</li> <li>• Elements-rules-goals-plans-decision: the model of analytical, proficient performer.</li> <li>• Ability to think on one's feet (confidence, reflection, choice of action and risk taking).</li> </ul>	The individual learns to apply hierarchical, prioritising procedure for decision-making on the basis of set priorities rather than on total knowledge of the given situation. Choosing the goal and plan is not unproblematic—it implies personal involvement in actions, hence responsibility/ethics.
<b>Proficient Performer</b>	Away from cognitivist, analytical rationality (rules, principles, and universal solutions) towards	<ul style="list-style-type: none"> <li>• The awareness of interpretation and judgment involved in such decision-making, rather than logical information processing and analytical problem solving only.</li> <li>• Deeply 'involved-in-the-world' manager/performer who already knows as he/she has evolved their understanding of the situation on</li> </ul>	Intuitively understands and organizes the tasks in the local situation in the living present but continues to reflect analytically on what will

Level	Experience	Action based on...	Comment
	perceiving situations rapidly, intuitively, holistically, visually, bodily, relationally.	the basis of prior actions and experience. <ul style="list-style-type: none"> <li>• Reflective understanding and participation in power relations.</li> </ul>	happen as the emergent situation unfolds.
<b>Expert or Virtuoso</b>		<ul style="list-style-type: none"> <li>• Emergent enquiry' – participative methodology of knowledge creation in context.</li> <li>• Intuitively, synchronously.</li> <li>• Participative critical reflection over the intuition – the self and the group.</li> <li>• The thought, body, knowledge, and action are inseparable, are simultaneously forming and are being form [sic] by one another; thinking- doing.</li> <li>• Understanding that power relating is an intrinsic part of intersubjective relating, always there.</li> <li>• Considerations for the present and deliberation about the future.</li> </ul>	Characterised by effortless performance at the level of virtuosity; No thinking/doing, decision/action, or plan/implement divide; Action based on logic replaced by experientially based action; intuitive and rational at the same time.

## **Appendix 6–Project Management Certifications in Australia**

### **Project Management Institute (PMI)** *Adapted from the Project Management Institute (2014)*

The Project Management Institute (PMI) was founded in 1969 by a number of individuals who understood the value of networking, sharing process information and discussing common project problems. After their first official meeting in October of that year at the Georgia Institute of Technology in Atlanta, Georgia, USA, the group officially incorporated the association in Pennsylvania, USA. PMI has grown to become a global advocate for project managers with more than 260,000 members in over 171 countries, with six chapters in Australia. The PMI offers a knowledge based online test to demonstrate capability at three levels of project and program management proficiency:

#### **Program Management Professional (PgMP)**

PMI's Program Management Professional (PgMP) credentialing service offers a credential designed to demonstrate project and program management skills.

#### **The Project Management Professional (PMP®)**

Individuals who hold PMI's PMP credential demonstrate a proficient level of project management leadership skills.

#### **The Certified Associate in Project Management (CAPM®)**

Designed specifically for project team members, the CAPM credential is aimed at improving overall project success by helping to ensure project management knowledge.

### **Australian Institute of Project Management (AIPM)** *Adapted from the Australian Institute of Project Management (2014)*

The Australian Institute of Project Management (AIPM) was formed in 1976 as the Project Managers' Forum and has been instrumental in progressing the practice of project management in Australia over the past 30 years. The AIPM's espoused role is to improve the knowledge, skills and competence of project team members, project managers and project directors, all of whom play a key role in the achievement of business objectives, not just project objectives. AIPM also aims to ensure those involved at other levels in an organisation, and the community, understand the key role of project management in today's society. In the early 1990s the AIPM developed project management competency standards which have been

regularly reviewed to align to Australian National Competency Standards. The AIPM uses these standards as the basis for their Registered Project Manager (RegPM) certification program to identify the level of competency of project managers. The candidates, under the guidance of a Workplace Assessor, prepare a portfolio of evidence for assessment against one of the following competency levels:

### **Certified Practising Portfolio Executive (CPPE)**

The Certified Practising Portfolio Executive is responsible for managing a portfolio of projects at the strategic level within an organisation. They will have business, management, consultant or extensive project management experience; detailed knowledge of project and program management principles, concepts and techniques; and experience managing and evaluating cross organisational or cross industry projects and programs that have a significant impact on an organisation, industry sector or the public.

### **Certified Practising Project Director (CPPD)**

The Certified Practising Project Director is responsible for project or program management. They understand high level project management tools and methodologies and ensure the appropriate application of a project management methodology. Project Directors are involved across a range of technical project management areas and/or management functions including the development of new criteria or applications or knowledge or procedures relating to project management. The standards at this level are aligned to the Australian Qualification Framework Advanced Diploma level.

### **Certified Practising Project Manager (CPPM)**

The Certified Practising Project Manager will manage project team/s and have responsibility for overall project outcomes and employs self-directed application of project management knowledge and skills, with substantial depth in project management tools and methodologies. They may participate in the development of strategic initiatives, and participate in planning and evaluating functions for their project which may fall under wider programs or portfolios. The standards at this level are aligned to the Australian Qualification Framework Diploma level.

### **Certified Practicing Project Practitioner (CPPP)**

The Certified Practicing Project Practitioner level is aimed at individuals who may be members of a project team but with no direct responsibility for the overall project outcomes. They can identify and apply project management skills and knowledge in a wide variety of contexts with depth in some areas. The standards at this level are aligned to the Australian Qualification Framework Certificate IV level.

### **International Project Management Association (IPMA) *Adapted from the International Project Management Association (2014)***

The first project management association to be formed was the International Project Management Association (IPMA) in Vienna in 1965. The IPMA evolved from a discussion among a small group of practitioners in what was then the new discipline of project management. Those individuals decided to create an organisation that would allow project managers to learn, network and propose ideas. What started out as a forum for the exchange of experiences among international project managers evolved over four decades into a worldwide professional association with more than 40,000 members in almost 40 countries. In Australia the AIPM is the Australian representative association.

The IPMA Competence Baseline (ICB) is the basis for the IPMA 4 Level certification system. It is a standard setting out the knowledge and experience expected from the managers of projects, programs and project portfolios. The ICB defines the technical, behavioural and contextual competence elements of project management. The IPMA has four levels of certification:

#### **IPMA Level A—Certified Projects Director**

The Certified Projects Director has at least five years of experience in project portfolio management, program management or multi-project management, of which three years in responsible leadership functions in the portfolio management of a company/organisation or a branch or in the management of important programs.

#### **IPMA Level B—Certified Senior Project Manager**

The Certified Senior Project Manager has at least five years of project management experience, of which three years are in responsible leadership functions of complex projects.

#### **IPMA Level C—Certified Project Manager**

The Certified Project Manager has at least three years of project management

experience

in responsible leadership functions of projects with limited complexity.

**IPMA Level D–Certified Project Management Associate**

The Certified Project Management Associate has experience in the project management competence elements but this is not compulsory. It is an advantage if the candidate has applied their project management knowledge to some extent.



## Chapter 3: Research Methodology and Methods

*'I often say that research is a way of finding out what you are going to do when you can't keep on doing what you are doing now.'*

Charles F. Kettering, American inventor (1876–1958)

### 3.1 Introduction

In this chapter the research methodology and methods are positioned within the context of the four research questions that emerged from a review of the literature in Chapter 2. The research questions ask how project managers acquire and exchange knowledge, and what the project management environment and drivers mean to knowledge exchange. These questions underpin a discussion of the research paradigm, the research framework, and the selection of an action research methodology. An overview of the research methods will include a definition of the scope of the research, the selection of a research sample, and the use of an external reference group. The action research interventions and the use of a specifically designed tool to guide knowledge exchange will be described next. Following that, the method for data collection and analysis will be explored. The chapter will conclude with how quality and ethics are addressed in this research study.

The research specifically needs to address how individual project managers acquire and exchange knowledge when working on projects, and is suited to using a dual action research 'spiral' that cycles across four interventions. Action research is defined as:

*'... a flexible spiral process which allows action (change, improvement) and research (understanding, knowledge) to be achieved at the same time. The understanding allows more informed change and at the same time is informed by that change. People affected by the change are usually involved in the action research. This allows the understanding to be widely shared and the change to be pursued with commitment'*  
(Dick 2002a, p. 1).

### 3.2 Research Questions

To deliver a project it is necessary for the project managers to exchange their acquired knowledge with appropriate individuals or groups. 'Appropriate' means people who may hold a similar level of knowledge or status in an organisation or those who are above or below this

perceived level. This form of communication generally occurs through written, verbal or nonverbal means in various forms, including contemporary electronic methods. I have directly and indirectly observed this exchange of knowledge for over 20 years when managing projects in Australia and Asia, where I queried which activities and interventions had effects on the outcomes of the projects and people involved. The experiences I had led to awareness that if knowledge was sometimes not exchanged appropriately or in an *ad hoc* manner, the result could be unexpected and sometimes unintended outcomes would create problems in managing and delivering projects. This concern, coupled with what appeared to be an intergenerational loss of project management knowledge, led to a review of the literature (Chapter 2). This literature review resulted in a reframed set of research questions that address:

1. WHAT are the sources of knowledge? This leads to an examination of how project managers *acquire knowledge*.
2. HOW does knowledge exchange happen? This leads to an examination of how project managers *exchange knowledge*.
3. WHERE does knowledge exchange happen? This leads to an examination of the project management *environment*.
4. WHO makes knowledge exchange happen? This leads to an examination of what *drives* knowledge exchange.

### **3.3 Research Paradigm**

The selection of an appropriate social science on which to base the research paradigm will offer a framework to address the specific research questions in this study. The definition of a paradigm by Guba and Lincoln (1994), noted below, forms the foundations from which I selected an interpretivist approach for the research, as:

*'A paradigm may be viewed as a set of basic beliefs (or metaphysics) that deals with ultimates or first principles. It represents a worldview that defines, for its holder, the nature of the "world", the individual's place in it, and the range of possible relationships to that world and its parts, as, for example, cosmologies and theologies do' (Guba & Lincoln 1994, p. 107).*

To identify the specific research paradigm, I needed to explore the following three questions suggested by Guba and Lincoln (1994):

1. 'Ontological Question: What is the form and nature of reality and, therefore, what is there that can be known about it?
2. Epistemological Question: What is the nature of the relationship between the knower or would-be knower and what can be known?
3. Methodological Question: How can the inquirer (would-be knower) go about finding out whatever he or she believes can be known?' (Guba & Lincoln 1994, p. 108).

Through answering each of these questions, I was more able to clearly identify if the research required a positivist, interpretivist or critical theorist approach. A positivist researcher relies on sensory experiences to construct empirical evidence. Interpretivist research involves the researcher analysing how people take action either consciously or unpredictably. Using critical theory, the researcher can generate an understanding of society at a time to encourage autonomy and reduce domination. A comparison of the positivist, interpretivist, and critical theorist research paradigm used within the ontological, epistemological and methodological questions are listed in Table 9 (Voce 2004).

Questions for analysing paradigms		Research paradigms		
		Positivist	Interpretivist	Critical Theory
<b>Ontological Question</b>	What is the form and nature of reality?	<ul style="list-style-type: none"> <li>▪ An objective, true reality exists which is governed by unchangeable natural cause-effect laws.</li> <li>▪ Consists of stable pre-existing patterns or order that can be discovered.</li> <li>▪ Reality is neither time-nor context-bound.</li> <li>▪ Reality can be generalised.</li> </ul>	<ul style="list-style-type: none"> <li>▪ The world is complex and dynamic and constructed, interpreted and experienced by people in their interactions with each other and with wider social systems i.e. fluid definitions of a situation created by human interaction/social construction of reality.</li> <li>▪ Reality is subjective. People experience reality in different ways. Subjective reality is important i.e. what people think, feel, and see.</li> <li>▪ Reality can only be imperfectly grasped.</li> <li>▪ The use of language defines a particular reality.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Governed by conflicting, underlying structures, contradictions and exploitation—social, political, cultural, economic, ethnic, gender.</li> </ul>
<b>Epistemological Question</b>	What is the basic belief about knowledge - what can be known?	<ul style="list-style-type: none"> <li>▪ Knowledge can be described in a systematic way.</li> <li>▪ Knowledge consists of verified hypotheses that can be regarded as facts or laws.</li> <li>▪ Probabilistic—i.e. holds true for large groups of people or occurs in many situations.</li> <li>▪ Knowledge is accurate and certain.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Knowledge is based not only on observable phenomena, but also on subjective beliefs, values, reasons, and understandings.</li> <li>▪ Knowledge is constructed.</li> <li>▪ Knowledge is about the <i>way</i> in which people make meaning in their lives, not just <i>that</i> they make meaning, and <i>what</i> meaning they make.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Knowledge is dispersed and distributed.</li> <li>▪ Knowledge is a source of power.</li> <li>▪ Knowledge is constituted by the lived experience and the social relations that structure these experiences.</li> <li>▪ Events are understood with social and economic contexts.</li> </ul>

Questions for analysing paradigms		Research paradigms		
		Positivist	Interpretivist	Critical Theory
<b>Methodological Question</b>	How can the researcher go about finding out whatever they believe can be known?	<ul style="list-style-type: none"> <li>▪ Survey studies.</li> <li>▪ Experiments.</li> <li>▪ Verification of hypotheses.</li> <li>▪ Statistical analysis.</li> <li>▪ Quantitative descriptive studies.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Field research conducted in natural settings in order to collect substantial situational information.</li> <li>▪ Unstructured observation.</li> <li>▪ Open interviewing.</li> <li>▪ Discourse analysis.</li> <li>▪ Try to capture 'insider' knowledge.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Participatory action research.</li> <li>▪ Dialogical methods—which encourage dialogue between researcher and researched.</li> </ul>

*Table 9: Research paradigms adopted from Voce (2004, pp. 2-5)*

The interpretivist research paradigm has been selected for this research as I required a lens to explore what was taking place in the context of a project management environment, to gain an understanding of reality that is unable to be separated from what transpires during the exchange of knowledge. Conducting research this way allows the themes to emerge to inform an understanding, through interpretation of the interactions and the context in which the project manager delivers projects. Using field research in the form of onsite interviews and *in situ* observations creates an opportunity for the research participants to collaborate in a meaningful construction of their reality. The selection of an interpretivist research paradigm to address the research questions requires:

*‘Understanding the complex world of lived experience from the point of view of those who live it ... The world of lived reality and situation-specific meanings that constitute the general object of investigation is thought to be constructed by social actors’  
(Schwandt 1994, p. 118).*

To capture the research participants’ reality I needed to be located in their workplace to understand how these social actors interpreted the facts through their own experiences (Polanyi 1969). This interpretation of experiences can also be seen in the research conducted by Piaget (1971), Guba and Lincoln (1994), and in the work done by Gregor (2006). However, the potential limitation of interpretation can be an issue where ‘... multiple “knowledges” can coexist when equally competent (or trusted) interpreters disagree’ (Guba & Lincoln 1994, p. 113). The issue of interpretation and potential disagreement is addressed by using a research framework to identify the literature themes underpinning ‘... the entire constellation of beliefs, values, techniques, and so on shared by members of a given community’ (Kuhn 1970, p. 175). The literature themes I identified are detailed in the research framework in the following section.

### **3.4 Research Framework**

The research is situated in the project management literature and practice, and I developed a research framework to address the areas to be studied. The evolution of a research framework began with a review of the literature to identify the approaches used to acquire and exchange knowledge and the impact of the environment and drivers that underpin knowledge acquisition and exchange. These approaches formed the themes described in ‘Chapter 2: Literature Review’, where literature clusters link back to the research concerns. The research is not based on proving or disproving a theory, and as such this research framework is necessary

to establish a foundation on which to organise the research themes. These themes are then used as the basis for examining the data in 'Chapter 4: Data Collection and Analysis'. The outcomes of the comparison with the data will be reviewed against relevant theories in 'Chapter 5: Discussion'. The initial research framework is included below in Figure 6, with the evolution of the research focus included in Figure 7 to demonstrate the dynamic evolution of the study.

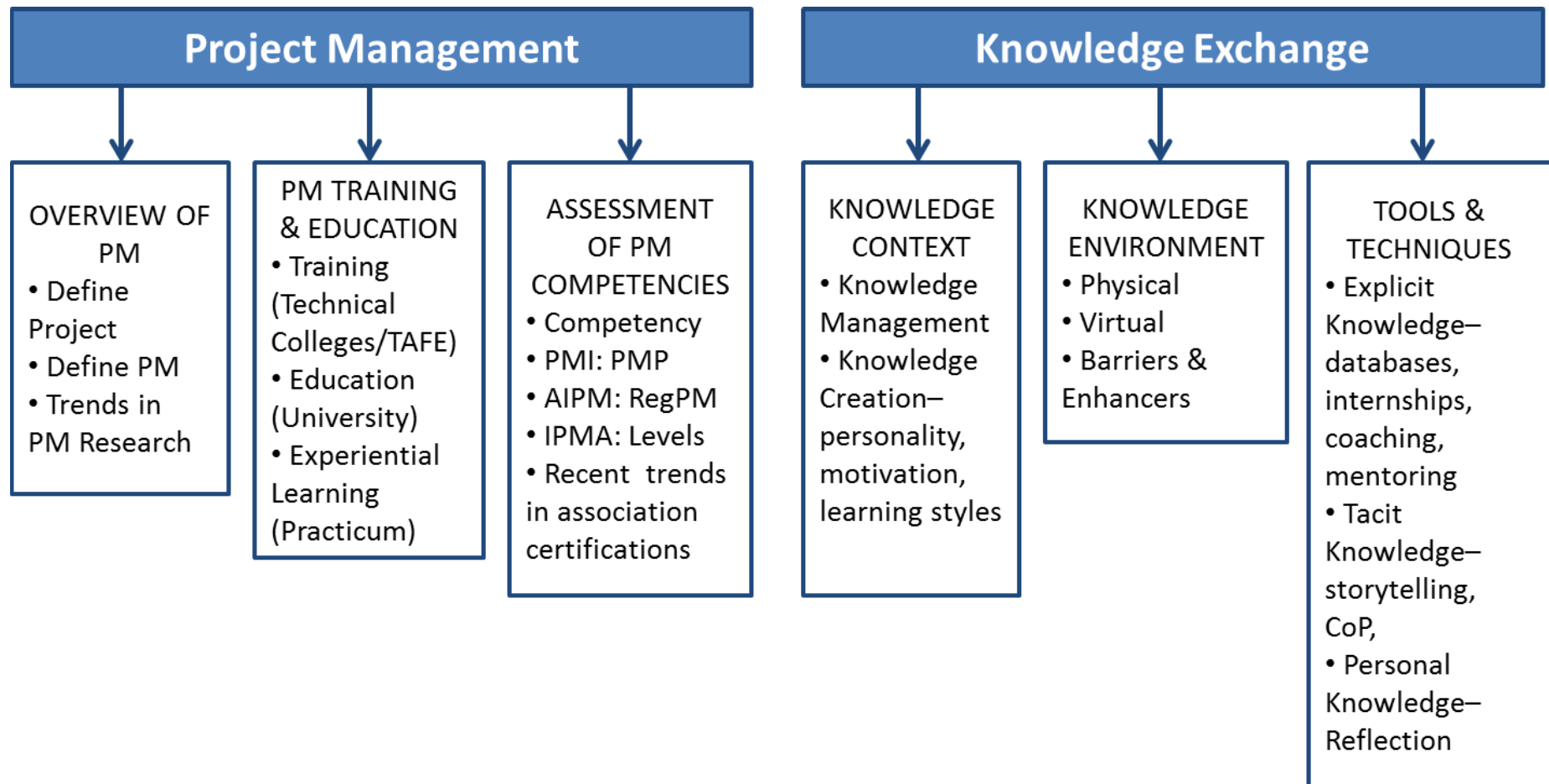


Figure 6: Initial research framework included broad headings and grouped areas for review in the literature



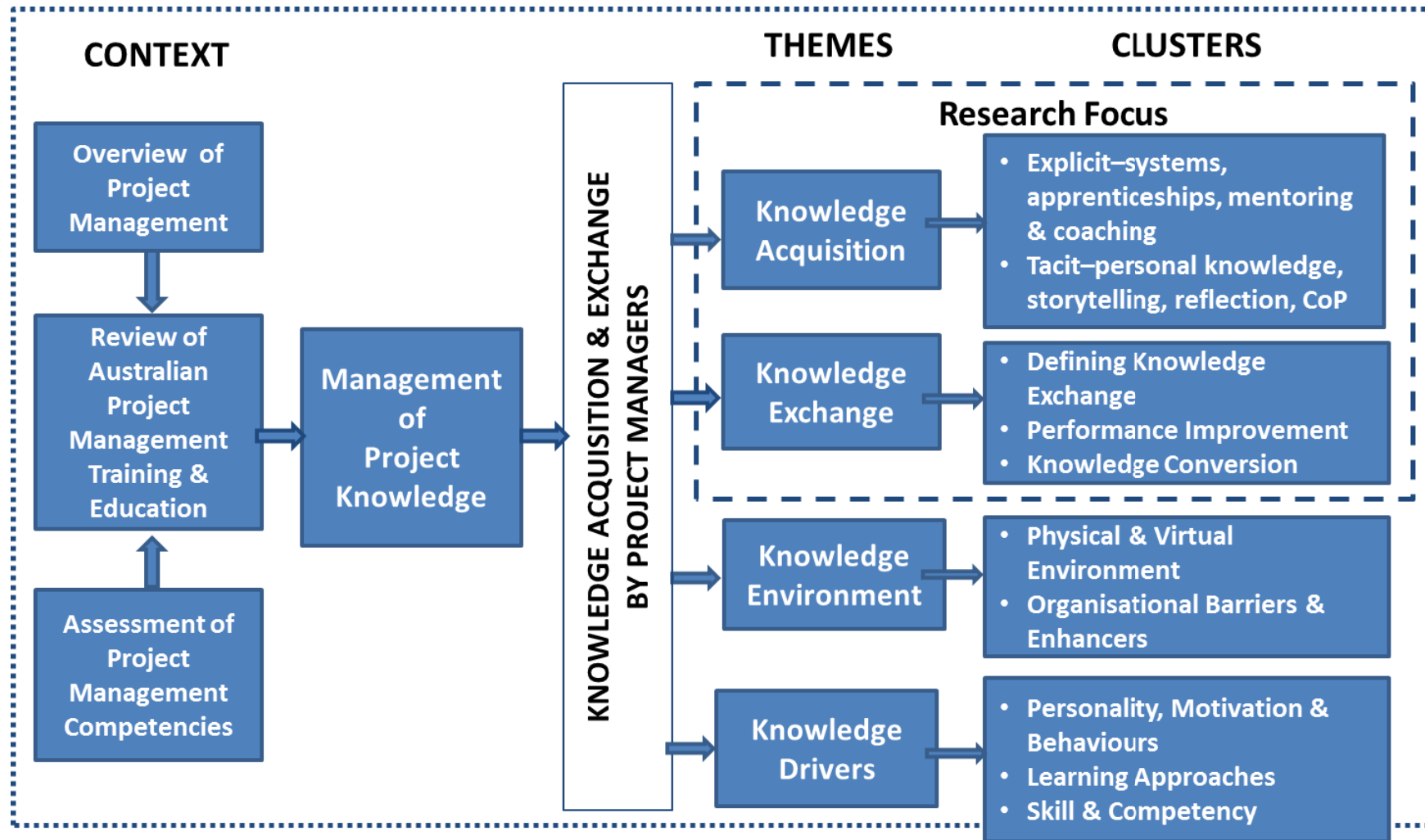


Figure 7: Final research framework demonstrating the dynamic evolution of the research focus

### **3.5 Research Methodology**

To ensure a clear understanding of the difference between research methodology and research methods, the following definition from Runeson (1999) was used:

*‘The word “methodology” has two meanings. The first meaning concerns the principles and procedures of orderly thought or process applied to a particular scientific discipline. The second meaning is the branch of logic that deals with the nature of such principles and process. Method, on the other hand, refers to the techniques that are used or are available for the research’ (Runeson 1999, p. 39).*

To examine what was occurring in the project managers’ workplaces, I needed to observe the research participants at work to gather the necessary empirical evidence. The approach of this research in intensively observing project managers in a social setting, can be classified according to Windelband’s (1980 (reprint)) observations he deemed as idiographic, or ‘... concerned with the unique, immanently defined content of the real event’ (1980 (reprint), p. 175). The idiographic nature of this study directed the investigation toward the processes used to examine social settings. These processes were introduced in the form of data gathering techniques associated with the action sciences. Action science is defined by Argyris, Putnam and McLain Smith (1985) as ‘... an inquiry into how human beings design and implement action in relation to one another’ (p. 4) that ‘... seeks both to promote learning in the client system and to contribute to general knowledge’ (p. 36).

The study of how project managers acquire and exchange knowledge is in ‘... a family of research methodologies that pursue the dual outcomes of action and research.... profit[ing] from the use of a cyclical or spiral process in which the researcher alternates action with critical reflection’ (Dick 2002b, p. 159). The selection of an action research methodology to address the research questions from a pragmatic position meets Oquist’s (1978) definition of action research which ‘... corresponds to the pragmatist view of how man produces and justifies knowledge and is backed by the pragmatist positions with regard to the union of theory and practice ... in the process of the production of knowledge’ (Oquist 1978, p. 154).

#### **3.5.1 Methodological Models**

To undertake research into practice, action research offers a process to plan, act, observe, and reflect in iterative cycles. A four stage cycle represents what Kolb (1984) describes when referring to Lewin’s (1952) experiential learning model as ‘... a social learning and problem-

solving process that generates valid information to assess deviations from desired goals. This information feedback provides the basis for a continuous process of goal directed action and evaluation of the consequences of that action' (Kolb 1984, pp. 21-2).

To develop an appropriate method to undertake this action research study, several models are investigated using a variety of approaches to solving problems in a social setting. Checkland and Scholes (1990, p. 283) created the Framework, Methodology and Action (FMA) model, further developed by Checkland and Holwell (1998) to ensure rigour through '... a desired-in-advance intellectual framework of ideas' (cited in Sankaran, Hou Tay & Orr 2009, p. 186). In the experiences of a cohort of action researchers, it was their '... experience that the FMA model can be applied to other areas of business application beyond IT projects' (Sarah et al. 2002, p. 537). The FMA model is depicted in Figure 8 below, in addition to the application of this model to the research study in Figure 9.

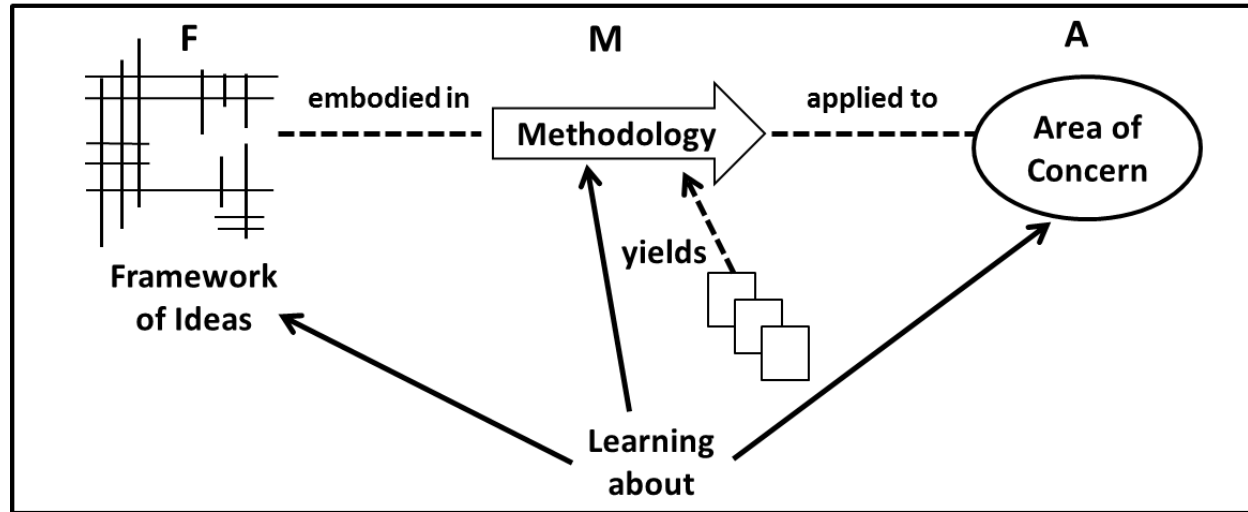


Figure 8: Research approach underpinned by the FMA model (Checkland & Holwell 1998, p. 13)

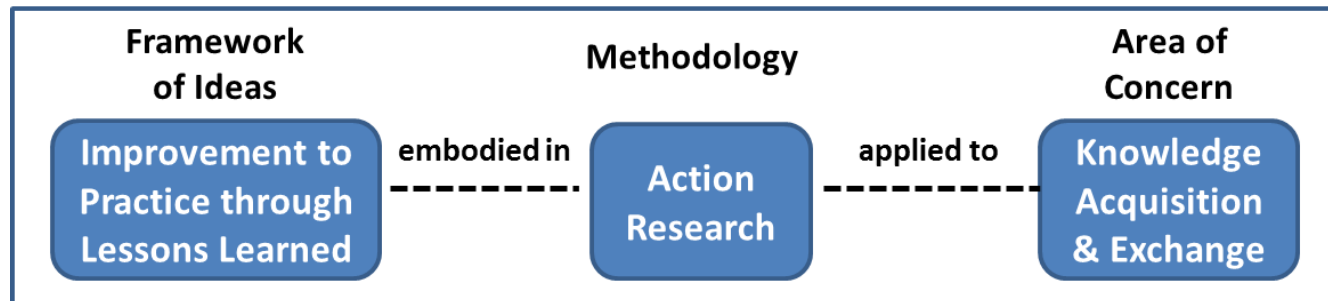


Figure 9: Application of the FMA model to this research

The application of this research to the FMA model includes the following components:

- *'Framework of Ideas'* has been generated from my perspectives as a lecturer and as a project manager.
- *'Methodology'* is action research.
- *'Area of Concern'* is to identify how knowledge is acquired and exchanged in a project context.

The approach to situating this research according to a framework of ideas, using an appropriate methodology to address an area of concern in a project management context, was used by Cicmil (2006) to address '... the relationship between the research process and the nature of knowledge created through this process' (Cicmil 2006, p. 29). This process was used to expand the 'Rethinking Project Management Network' research study (Cicmil et al. 2006) which was aimed at understanding the '... complex social processes that go on at various levels of project working' (Cicmil et al. 2006, p. 676). The development of a model to demonstrate '... the interconnectedness of the elements in the process of management research' (Cicmil 2006, p. 29) is closely aligned to the FMA model, as shown below in Figure 10.

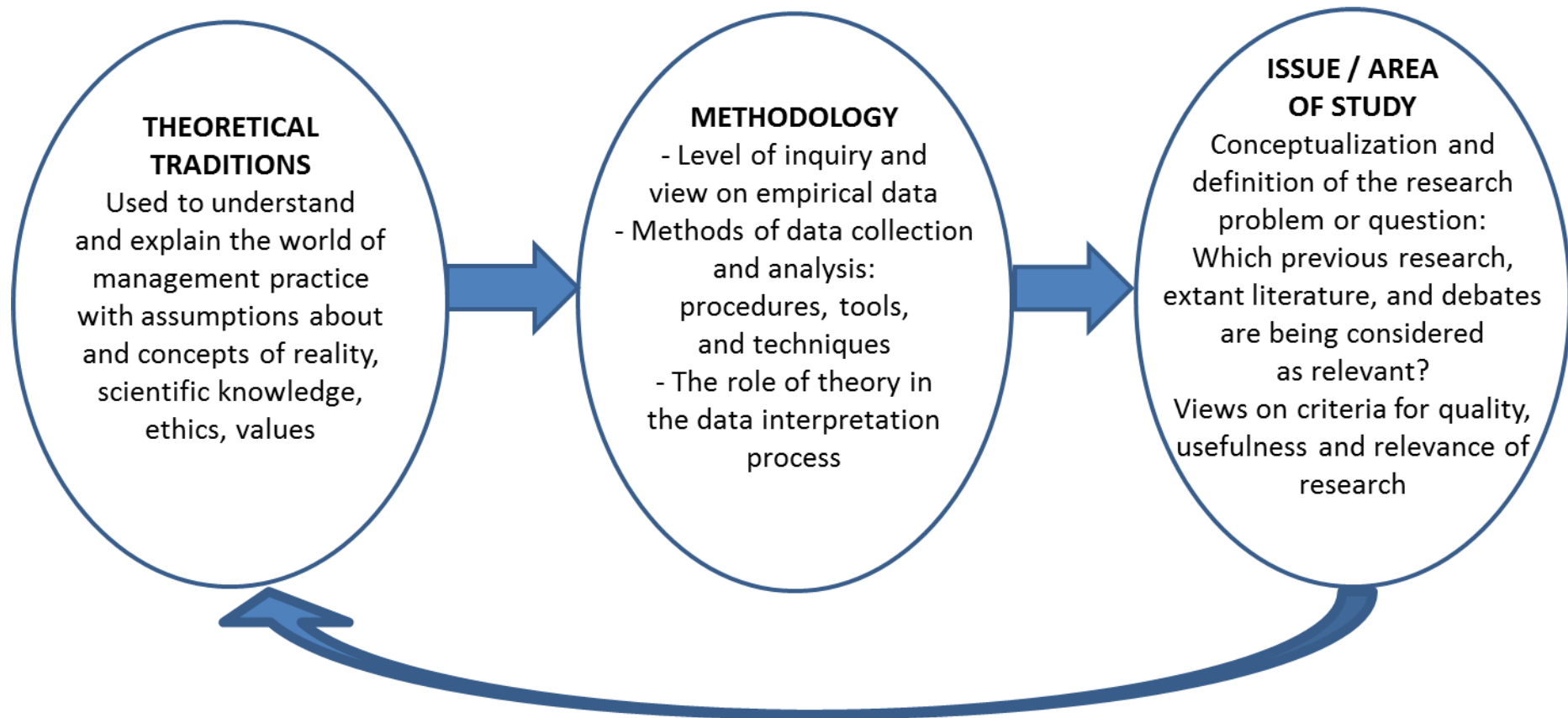
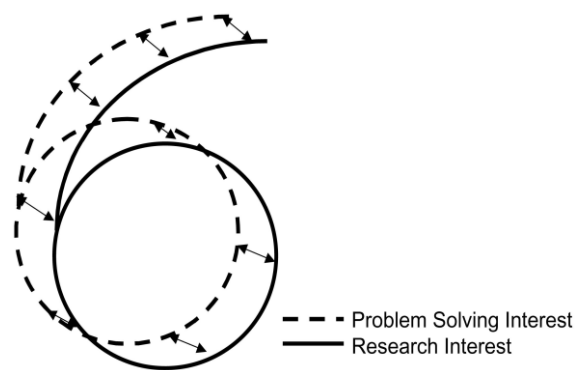


Figure 10: A representation of the research activity as a knowledge creation process and the interconnectedness between its key elements (Cicmil 2006, p. 29)

A dual cycle approach to action research, where a problem is investigated at the same time as research is being undertaken, was developed by McKay and Marshall (2001, p. 49) and based on a single cycle action research approach developed by Susman and Evered (1978), Checkland (1991), and Burns (1994). To extend Checkland and Scholes (1990) FMA model for this research, the work of McKay and Marshall (2001) was reviewed to identify how cycles of problem-solving activity could be incorporated into the research interest. The interlinked approach of solving a problem and at the same time meeting a research need to ‘... bring about improvements through making changes in a problematic situation’ (McKay & Marshall 2001, p. 50) is illustrated in Figure 11.



*Figure 11: Action research viewed as a dual cycle process of solving a problem while addressing a research interest (McKay & Marshall 2001, p. 52)*

This problem solving and research interest model offers the link to action research I was looking for to help me generate new insights into how knowledge was acquired and exchanged by project managers. I was, however, not investigating a problem, but a concern I experienced as a project manager when reflecting on project issues. The inclusion of reflection in an action research approach led me to examine the ‘Plan-Act-Observe-Reflect’ model proposed by Kemmis and McTaggart (1988) in ‘The Action Research Planner’. The Planner was developed ‘... to explore some of the problems and possibilities of action research through a variety of projects in schools and other settings’ (Kemmis 2001, p. 91).

To access a deeper understanding of the knowledge acquisition and exchange processes, I also needed to include ‘... collaborative inquiry carried out by people affected by a problem or concern, often using a cyclical process to increase their understanding of the real problem before moving towards a solution’ (Sankaran, Hou Tay & Orr 2009, p. 181). These cycles of evaluation are recommended as a way of ‘... pursuing multiple sources of information’ (Dick

1999b, p. 4) where the researcher should ‘... ask more questions and give fewer answers’ (Dick 2009, p. 427).

### 3.5.2 The Research Model

The research specifically needed to address how individual project managers acquire and exchange knowledge when working on projects using a dual action research spiral approach cycling through interventions. This approach did not precisely fit into the definition of participatory action research, as the research participants would not be involved as ‘... groups work[ing] together to change *their* language, *their* modes of action, and *their* social relationships’ (McTaggart 1997, p. 185 - original italics).

To address this concern I developed a series of interventions designed to change the way project managers would acquire and exchange knowledge while working on their projects. The number of interventions created was based on the need to ‘... uncover a distinct contribution to knowledge’ (Perry & Zuber-Skerritt 1992, p. 205) through the perspective of the research participants, their colleagues, and my observations as both a researcher and an experienced project manager. The approach to undertaking the research required additional reflective cycles which, after reviewing the literature, was found in Piggot-Irvine’s ‘Problem Resolving Action Research (PRAR) Model’ (2001, p. 155). The incorporation of three spin-off cycles offers an opportunity for the research participants, and the researcher, to record activities, stories, conclusions, and identify areas for further improvement (Piggot-Irvine 2006, p. 489).

The first iteration of the action research process was adapted from Piggot-Irvine’s (2001, p. 155) ‘Problem Resolving Action Research (PRAR) Model’ is depicted in Figure 12 and the final model is included in Figure 13 to demonstrate and compare the adaptation. The research methodology is described in detail in this chapter in ‘Section 3.5 Research Method’ to ensure the research can be replicated in future studies.



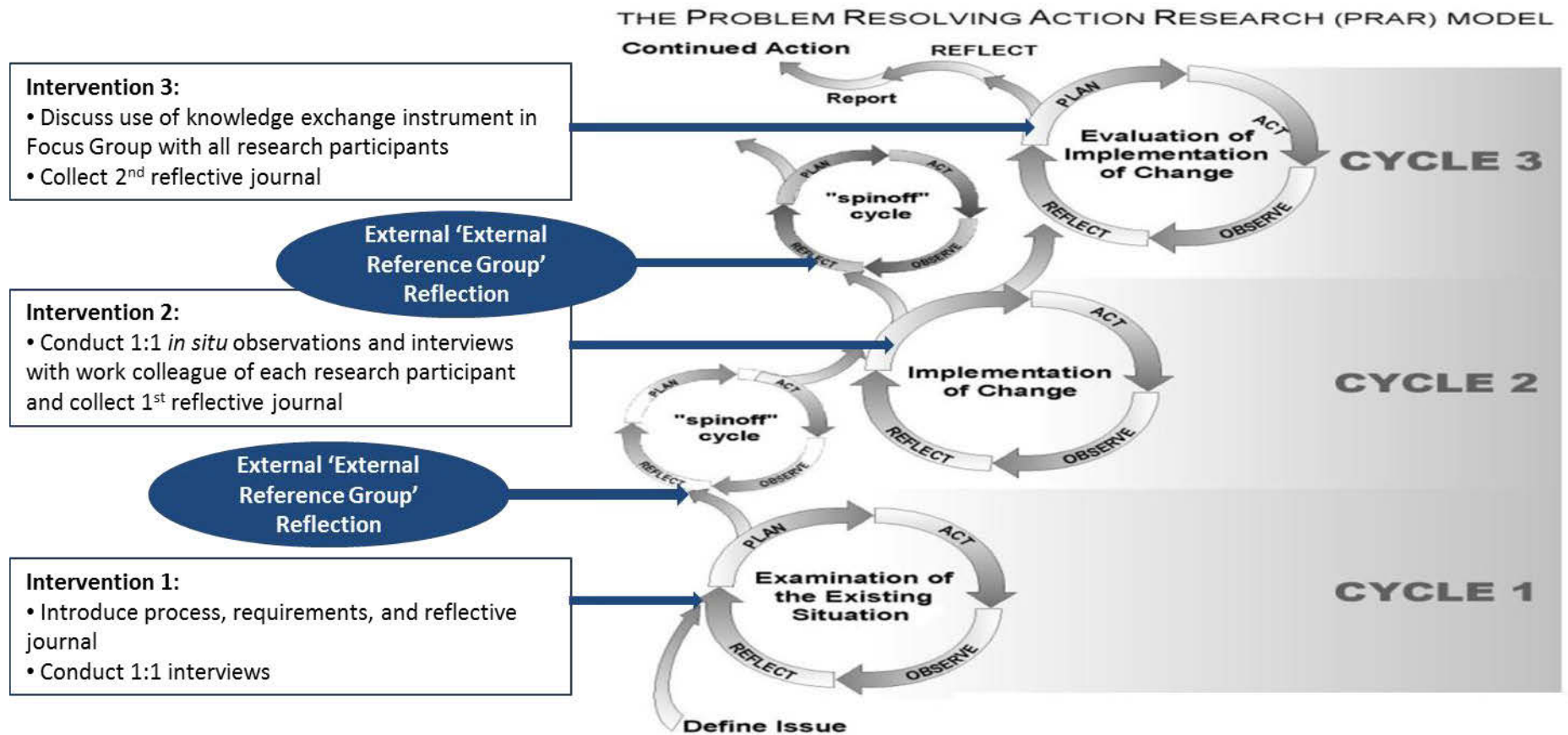


Figure 12: The first Iteration of the action research methodology adapted from the Problem Resolving Action Research (PRAR) Model (Piggot-Irvine 2001, p. 155)

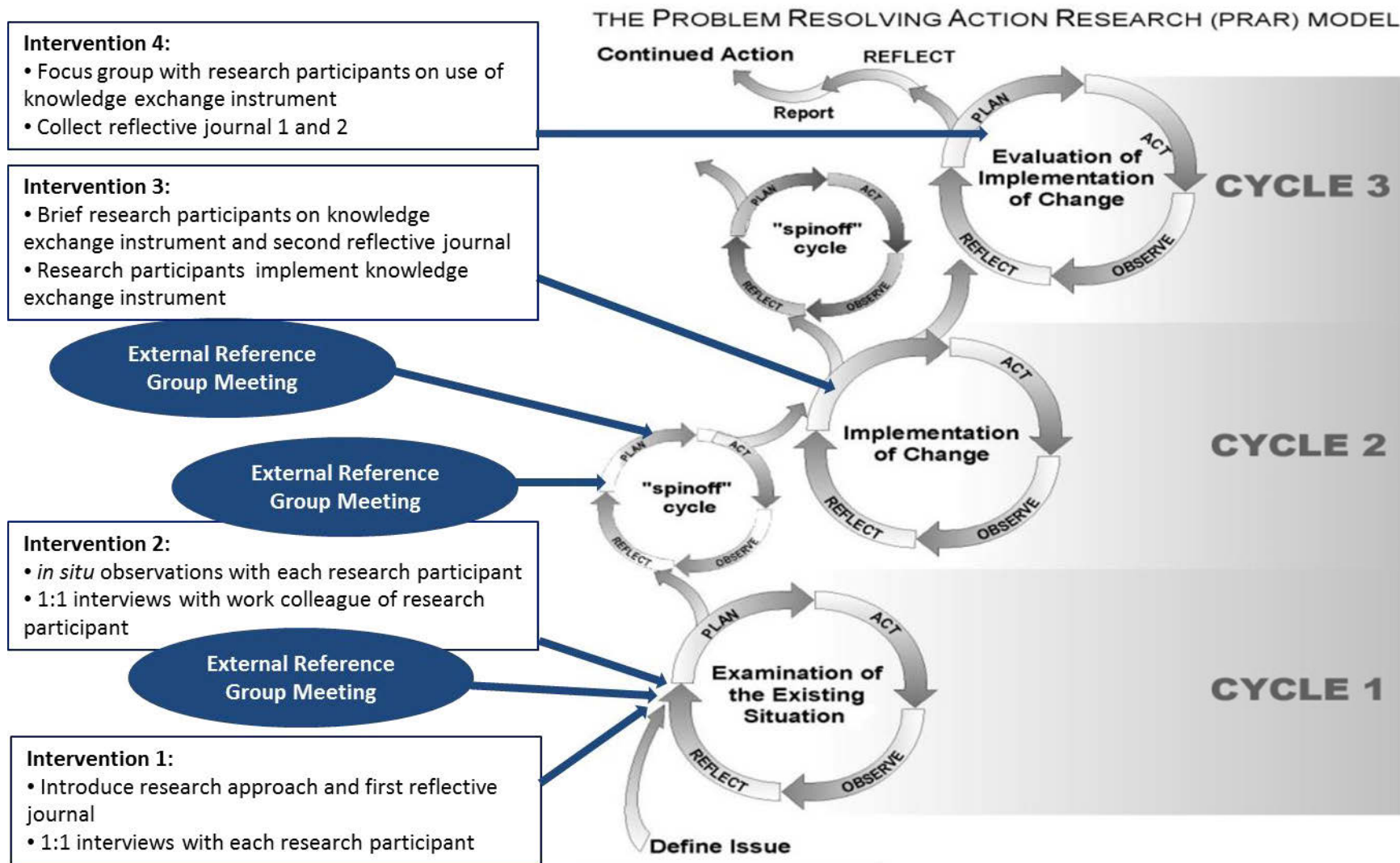


Figure 13: The final iteration of the methodology demonstrating a dynamic change to the action research approach augmenting the Problem Resolving Action Research (PRAR) Model (Piggot-Irvine 2001, p. 155)

The developmental research model was used to frame the research according to three action research cycles used to intervene in the research participant's practice of managing projects. The first and second interventions were conducted to examine the existing situation where the research participants were working. The third intervention was designed to implement a change through the introduction of a different way of working, and the fourth intervention offers a forum to evaluate the change the research participants implemented. Throughout the action research cycles, the involvement of an external reference group, described in further detail in 'Section 3.8.1 External Reference Group', yields additional insights through this spin-off cycle. During the interventions and the meetings with the external reference group, I planned what was to occur, acted, observed and reflected, following the cycle depicted in Piggot-Irvine's (2001) 'Problem Resolving Action Research (PRAR) Model' (2001, p. 155).

Through using this augmented action research methodology, a framework is developed to understand how the research participants acquire knowledge, the dynamic nature of knowledge exchange, the personal drivers to exchange knowledge, and the impact of their environment on this process. In this context, augmented is a reference to the traditional action research approach adapted by adding an external reference group. Underpinning the action research approach, seven core values were adopted from Zuber-Skerritt (2005, p. 53) throughout the study. These core values are listed in Table 10 and include how each was addressed in the research.

Table 10: Seven core values of Action research, adapted from Zuber-Skerritt (2005, p. 53)

Core Value	Demonstrated Inclusion in the Research Study
1. Advancement of knowledge and learning	Through providing the research participants with tools to apply and interventions where they could reflect and learn.
2. Collaboration	Through working with the researcher and developing a heightened awareness through the interventions of their ability to collaborate.
3. Trust, respect and honesty	Through understanding of the requirements of conducting ethical research.
4. Imagination and a vision for excellence	Through the research participants' understanding the goals of the research, and implications for their practice.
5. Openness	Through the discussions held between me and the research participants.
6. Non-positivist beliefs	Through the understanding data was collected by observing and noting social interactions and feelings that were not quantifiable.
7. Success	Through reassuring the research participants they were part of an investigation providing them with knowledge and potentially enhanced opportunities.

To explore the links between the literature and practice, the research was structured around interviews, observations, and collaborative participation with the research participants and an external reference group. The research was conducted using this approach in iterative cycles of observation, intervention and reflection to be able to instigate a change in the research participants' practice.

### **3.6 Research Methods**

The methods developed to conduct the research are detailed in this section and included interviews, *in situ* observations, and collaborative participation with the research participants. This approach was designed to be able to consider the complex dynamics in a research participant's workplace and possibly improve their practice. The interventions included iterative cycles of reflection where a change was planned, and implemented and the consequences were in turn reflected upon before a replanning process occurred, and then

reflected on, and the spiral continued, sometimes with multiple cycles overlapping simultaneously.

To begin a field placement, I needed to ensure appropriate agreements were in place for the research participant and the place of work, learning tools needed to be identified and approaches discussed, and the place of work needed to be appropriate for the learning outcomes. Challenging issues could present themselves if the researcher and the research participant were not prepared for what Megginson and Boydell (1989) define as the learning blocks:

- Perceptual—learners cannot see or recognise the nature of the learning required.
- Cultural—learners rigidly adhere to a set of norms defining what is good or bad.
- Emotional—the emotional state of learners affects their ability to learn.
- Intellectual—learners may not have the intellectual skills necessary to complete a task.

During the research process, it was necessary for research participants and researcher to understand their mutual legal and ethical responsibilities and to exercise a duty of care towards each other and for other people involved in the research such as clients and colleagues. I also needed to be aware of specific issues such as: game playing, where covert agendas were being followed; mirroring, where the learner was unable to emotionally manage the situation and consequently exchanged responsibility or ownership, consciously or subconsciously; not meeting learning needs; and managing conflict. These could all be managed through appropriate preparation and early detection, with strategies ready to implement so these issues could be resolved accordingly.

Four interventions were undertaken to understand the context in which the research participants acquired and exchanged knowledge in their workplace. The data was recorded, both digitally and in writing, transcribed and then examined, using several grounded theory techniques to identify emergent themes and gaps. Content analysis of the research participants' discourse and behaviours was noted. In addition to the structured interviews and observations, the research participants completed a reflective journal to record their thoughts about how they exchanged knowledge, and then another reflective journal was used to record how they implemented a knowledge exchange instrument. I designed the knowledge exchange instrument based on discussions with the research participants during interventions one and two as a model of best practice to exchange knowledge. The knowledge exchange instrument

was reviewed with the external reference group to confirm applicability, and the relevance of the methodological approach to the research.

### **3.6.1 Research Sample**

The selection of a group of project managers to participate in this action research study fits with the approach Zuber-Skerritt and Perry (2002) suggest as it ‘... necessarily focuses on a workgroup in an organisation or community, all of whom are involved in the cycle of planning/ acting/ observing/ reflecting’ (2002, p. 173). I invited eight project managers to be involved in the research; unfortunately, two were unable to continue to the completion of the research. The remaining sample size of six has been shown by Mintzberg (1980a) and other social researchers (Carlson 1951; Hales 1986; Kotter 1999a, 1999b; Martin 1956; Mintzberg 1980b; Mumford & Gold 2004; Stewart 1967; Tengblad 2002), to be a valid number to use for in-depth research. Mintzberg (1980a) developed his theory of the nature of managerial work through observing a similar number of managers in their workplace. To observe managers in their workplace Mintzberg (1970) used structured observation combining ‘... the flexibility of open-ended observation with the discipline of seeking certain types of structured data’ (Mintzberg 1970, p. 89). Mintzberg observed managers using empirical evidence from recording events such as duration, participation, and purpose which ‘... are developed as the observation takes place’ (1970, p. 90) using chronology, mail and contact records. These categories present a comprehensive structure to collect data instead of what Mintzberg describes as ‘... Fayol’s fifty year old description of managerial work as planning, organizing, coordinating, and controlling’ (1970, p. 87).

Following on from Mintzberg, studies into what managers actually do was undertaken by Hales (1986) and included an analysis of Mintzberg’s predecessors in this area of study. The early researchers like Carlson (1951), Martin (1956) and Stewart (1967) studied managers in Sweden, the US and the UK respectively. These researchers used a range of techniques to gather data including checklists, questionnaires, diaries and interviews. Similar research studies were undertaken by Kotter into the ways organisations are managed (1999a) and led (1999b). In these studies, Kotter spent 12 months observing and interviewing 15 male executives with an average age of 47 and earning (in 1982 US dollars) over US\$200,000, which was a significant salary at the time. The executives were from nine manufacturing, service, financial and media corporations generating between US\$1 million and US\$1 billion in sales per year (in 1982 US dollars). Kotter reviewed documents the executives produced, including their diaries, and measured performance against a set of predetermined indices. The findings

of Kotter's research revealed several trends which were captured in his 'Ten Observations About Managerial Behaviour' (1999b, p. 9). Kotter observed what these managers did to logically prioritise for their groups, and their activities were described in timed diary notes and included transcribed conversations. What Kotter discovered was wasted time offered the managers an informal vehicle to engage '... in seemingly random chats with seemingly random people, all the while promoting their agendas and building their networks' (1999a, p. 159). The observations of Mintzberg, Fayol, Kotter, Hales, and others set the scene for this research into what project managers actually do to exchange knowledge.

## **Selection Criteria**

Based on Mintzberg's (1980a) desire for managers to learn on-the-job and Kotter's (1999a, 1999b) model of observing an executive's behaviour, this research focused on observing and interacting with the research participants. The group originally consisted of eight project managers to allow for any withdrawals, which occurred when two of the research participants were unable to continue to participate after intervention one. The research participants were selected from a network of project managers to represent a range of industries and projects types. The research participants all had a minimum of five years project management experience and were employed full-time as project managers in Australia.

Research participants were chosen from various industry sectors to enhance diversity. These sectors included information technology, engineering, financial services and public infrastructure. The range of industries was selected to preclude any effect of industry-specific behaviours. All research participants had achieved a formal qualification during their careers, although not exclusively in project management however, these degrees would have included project management subjects. Four of the research participants held an industry certification, such as a Project Management Professional (PMP) certification from the Project Management Institute (PMI) or a Registered Project management (RegPM) at the level of Certified Practicing Project Manager (CPPM) from the Australian Institute of Project Management (AIPM). It was anticipated these endorsements would offer a knowledge and experience base for the diversity required for the research.

To secure the research participants' agreement, a letter of consent outlining the participants, their employer, and my obligations was given to each research participant. Once approval was gained from the research participant and their employer, appointments were scheduled to undertake the research. In addition to the research participant, one of their colleagues was

selected and interviewed during the second intervention which occurred during an observation day at the research participant's workplace. This was to obtain a different perspective of how the research participant was actually behaving and exchanging knowledge with people working on projects. The colleague was selected by the research participant, based on the direct contact they had in their project work, their ability to have observed the participant and others, and the availability of the colleague to be interviewed on the observation day. There were no specific requirements for the colleague to be senior or junior to the research participant.

A summary of the eight initial research participants and an overview of their background and timing of the interventions are listed in Table 11. To ensure the confidentiality of the research participants their names have been changed. The pseudonyms were used to de-identify the research participants for this research, and are listed according to the North Atlantic Treaty Organization (NATO) phonetic alphabet which is also used for the International Civil Aviation Organization.



Table 11: Research participant summary

	Mike	Bravo	Whiskey	Delta	Sierra	Lima	Charlie (withdrew)	Zulu (withdrew)
<b>Role</b>	Owner	Project Manager	General Manager	Project Manager	Quality Manager	Project Manager	Project Manager	Business Analyst
<b>Industry</b>	Private Sector- Project Manager Consulting firm: operations	Private Sector- Project Manager Consulting firm: engineering	Public Sector- infrastructure: construction	Public Sector- infrastructure: utility	Private Sector- financial services: IT	Private Sector- financial services: IT	Private Sector- financial services	Public Sector- infrastructure: transport
<b>Location</b>	Canberra, ACT	St Leonards, NSW	Sydney, NSW	Parramatta, NSW	Sydney, NSW	Sydney, NSW	Sydney, NSW	Sydney, NSW
<b>Experience/ Years</b>	20+	20+	20+	10+	5+	15+	10+	15+
<b>Qualification</b>	Bachelor of Science, Operations Research	Bachelor of Civil Engineering	Bachelor of Civil Engineering; Master of Environmental Planning	Bachelor of Civil Engineering; Master of Legal Studies	Bachelor of Business	Bachelor of Science	Bachelor of Economics; Actuarial degree; MBA	Bachelor of Business; Master of Project Management; MBA
<b>Certification</b>	PMI, CPMP	AIPM, CPPD	n/a	n/a	PMI, PMP	n/a	n/a	PMI, PMP

To offer these research participants an opportunity to further develop their project management skills, I needed to establish a relationship with each person to ensure communication and cooperation occurred in an open and collaborative way. As Altrichter (1999) states ‘... action research holds that profound and lasting development of practice will only occur in collaboration with other persons concerned with the situation under research and not against their will’ (1999, p. 3).

## **Issues**

The reason eight research participants were initially selected was to allow for withdrawal during the data collection phase. As the first intervention closed and plans were in place for the second intervention, two of the research participants left the research study. The first to leave the research was Zulu who had concluded his employment contract and had re-negotiated a second term of two years in a different division with the same organisation. Unfortunately, his new manager was not prepared to allow the time to participate in the research. The second to leave the research project was Charlie who did not respond to emails and phone calls for two months. Direct contact was possible with the Chief Executive Officer (CEO) of the organisation who I knew personally, however I decided not to contact the CEO to ensure I was not seen to intimidate Charlie and instigate any of the associated risks to the value of the research.

### **3.6.2 Research Environments**

A naturalistic approach was desirable so the intervention took place where the project managers conducted their project work. This approach allowed for the observation of research participant behaviour and social interactions between the research participant and their colleagues and work groups. Collecting the data in the research participant’s workplace was designed to reduce any potential barrier to engage the research participant and allow them to feel comfortable and not interrupt their work day. Situating the observations in the research participant’s workplace also created the opportunity to make notations on the environment in which they conducted business. The second intervention noted the interactions of the research participants, yet the impromptu exchanges and the type of environment the research participant created in their workplace provided the richest data. These impromptu exchanges occurred when the research participant engaged with a colleague, or several colleagues, in an unscheduled interaction or vice versa, either in person or on the phone.

### **3.6.3 Interventions**

Three action research cycles were followed, using four interventions in the research participants' workplace. Scheduled appointments were booked with the research participants to ensure they were available and in the case of the second intervention, their work colleague was willing to be interviewed. The research participants were given written confirmation of the day and time they selected through an online diary, and an agenda was discussed over the phone and then by outlining the activity in an email.

To observe the research participant while working, I acted as a participant-observer to get close to the activities of the research participant. This approach assisted me to observe the research participant as they went about working on their projects in their workplace environment. The two activities included participant-observation through entering the social setting of the research participant, and then taking systematic field notes. This discipline of field research is described by three action research cycles undertaken through four interventions, as outlined in the follow section.

#### **Intervention One**

The first intervention occurred by conducting interviews individually with each research participant to determine how knowledge exchange occurs both at and beyond their workplace. Using interviews in this research allowed the research participant to '... explain their answers ... at length on a topic in their own words' (Veal 2005, p. 128), as opposed to limiting the responses to simple answers. This approach encouraged the research participant to engage with me and tell their story, giving the opportunity to probe deeply and uncover meaningful data. However, this technique required me to maintain a consistent approach to be able to compare and contrast the data.

The interview questions were related to existing constructs centred on specific areas of interest. The information collected included details of the background of each of the research participants and an explanation of how they learnt their project management skills and how they exchanged knowledge when working on projects. Research participants agreed to self-capture their activity and were given a hard copy reflective journal for recording their reflections between intervention one and intervention two. These reflections were to show how they exchange knowledge at work and ultimately were designed to be used as a way for the project managers to reflect on how they acquired and exchanged knowledge in their workplace. The interview sheets for the research participants are included as Appendix 1–RPI

for reference, and the first reflective journal template is included in Appendix 1–RJ for reference.

## **Intervention Two**

The *in situ* observation days were found by Kotter to be an effective way to observe how managers managed (1999a) and led (1999b). Using an *in situ* observation approach was essential to understand how project managers exchange knowledge in the workplace. However, at times ‘... gaining admittance to the social setting of interest may be a problem’ (Veal 2005, p. 134), and recording the exchanges may interfere with the observation.

At the beginning of the observation day the research participants gave me a copy of their diary entries for the day they met with me. These were used to compare the actual activity I observed was undertaken by the research participant during their workday with what had been scheduled in their diary. I conducted an initial discussion with the research participant before I started recording my observations using a pre-determined the observation day was what the research participant would like as a tool to guide their knowledge exchanges. I also discussed the responses they had given in the first interview, in regard to what they did when they exchanged knowledge to assist them in recalling what may be useful in a tool. This information was then used as input to develop a knowledge exchange instrument for the whole group to implement independent of each other after the third intervention, with their activity and reflections recorded in a second reflective journal. A chance discussion in the first intervention with Bravo led to the inclusion of an interview with a work colleague each research participant selected. This interview was intended to yield an independent perspective of how the research participant actually exchanged knowledge. I designed observation sheets to record the research participant’s exchanges *in situ*, presented in Appendix 2–OP for reference, and the questions used to interview their work colleagues are included in Appendix 2–WCI for reference.

## **Intervention Three**

The same knowledge exchange instrument was developed for each research participant after their input was reviewed from the first and second interventions and before the third intervention. In the third intervention the research participant was given a diagram, set of instructional questions, and a small pocket sized card for easy use when not at their desk. I designed the knowledge exchange instrument to be used by each research participant to guide

their exchanges of knowledge. The research participants' reactions to the use and perceived success and/or failure of the knowledge exchange instrument were recorded in their second reflective journal. The knowledge exchange instrument is included as Appendix 3–KEI for reference, and the format for the second reflective journal is included as Appendix 3–RJ for reference.

## **Intervention Four**

The fourth intervention was conducted as a collaborative focus group meeting where the research participants could discuss what they did with the knowledge exchange instrument in a series of structured questions. The selection of this approach gave the research participants an opportunity to engage in discussion with each other and myself, and to build on each other's experiences of using the Knowledge Exchange Instrument. To manage the possibility of '... one or two vociferous members of the group' (Veal 2005, p. 133) dominating the discussion, I invited one of the external reference group members to facilitate the meeting. This allowed me to focus on moving the discussion through pre-determined questions and record the interactions.

The focus group meeting was recorded, with notes taken on visible flip charts to agree on common responses and suggestions. I used questions to determine if the knowledge exchange instrument was used and what the outcomes were in regard to how it assisted or hindered the ability of the research participant to exchange knowledge. The focus group meeting format was used to elicit changes as each research participant outlined their experiences using the knowledge exchange instrument. The format for the focus group meeting and questions are included as Appendix 4–FG.

### **3.6.4 Tools**

#### **Two Reflective Journals**

The research participants were asked to capture their experiences of how they were exchanging knowledge and how they implemented the knowledge exchange instrument in the workplace. These additional sources of data offered a specific point of difference between what I recorded from the interviews, from what I observed *in situ*, and what their work colleagues suggested the research participants did in practice.

The approach to theory-in-practice, from the 'Rethinking Project Management' research agenda recommends the project manager move from being a trained technician to a reflective practitioner (Winter et al. 2006, p. 642). This assumes '... reflective thought includes a conscious and voluntary effort to establish belief upon a firm basis of evidence and rationality' (Dewey 1933, p. 9). More specifically, Boud (2001) states '... reflection involves taking the unprocessed, raw material of experience and engaging with it to make sense of what has occurred. It involves exploring often messy and confused events and focusing on the thoughts and emotions that accompany them' (2001, p. 2).

To encourage this reflective approach, and to capture the research participant's own perspectives of how they exchanged knowledge before and during the use of the knowledge exchange instrument, they were asked to complete two reflective journals. The use of a reflective journal gives the research participant a personal vehicle to help '... clarify your thinking, pose new questions and pursue issues only dimly perceived before' (Holly 1984, p. 39). Keeping a reflective journal '... documents what you do, events that hold significance for you, and to clarify your beliefs and assumptions, and further, to test these out in your behaviour' (Holly 1984, p. 20). The reflective journal offered both the research participant and myself a vehicle to help raise awareness of emergent patterns and behaviours resulting from the interventions. However, using reflective journals as a source of data relied on the research participants being diligent in completing and submitting each journal at the agreed time, which I needed to follow up on several occasions.

## **Knowledge Exchange Instrument**

The development of a knowledge exchange instrument gave the research participants a structure to consistently apply a process to exchange knowledge in various situations. This externalization of the tacit way the research participants exchanged knowledge was structured according to five key areas. These areas were focused on asking the research participants the following questions:

1. *Organisation*: what is the industry sector, the nature of the business, and level of maturity you are working with as this will overtly or covertly influence how you exchange knowledge?
2. *Individuals*: are the people involved experienced and hold the required qualifications/certifications, and will their personal traits support or hinder how you exchange knowledge?

3. *Relationship*: have you planned if knowledge will be exchanged formally or informally, how will you balance the power levels, and if trust is important, how will this be established and maintained?
4. *Tools*: do your tools to exchange knowledge need to be formal or informal, what procedures need to be followed or developed, and what are your technological needs?
5. *Project*: is the project strategic to the organisation, driven by time factors and what will be the impact of the expected outcomes?

A similar task cycle developed by Mumford (1995) offers an example of how managers were asked to ‘... think about the sequence of thought processes in which they engage while managing’ (Mumford 1996, p. 4). The task cycle moved through four core experiences including: taking action; seeing results; thinking about results; and planning next time.

To ensure the information was understood by the research participants, I developed a common nomenclature in the form of words and symbols underpinned by questions they could ask themselves as they entered an exchange situation. I also individually briefed each research participant on the knowledge exchange instrument in intervention three. The creation of categories to share knowledge in a structured way is proposed by Boisot and Griffiths (1999, p. 666) through codification and abstraction of data. The diffusion of data that is not coded will require the context to also be understood to assist with absorption of the information—an area not covered in this research.

I anticipated providing a tool for the research participants to consciously structure the exchange of knowledge would result in enhanced performance on their projects and ultimately for the organisation. Nahapiet and Ghoshal (1998) suggest, through their study on creating organisational advantage using the exchange of social and intellectual capital, that ‘... researchers increasingly recognize group-specific communication codes as a valuable asset within firms’ (1998, p. 254). This was demonstrated in a study by O’Dell and Jackson Grayson (1998) benchmarking performance in large organisations. They found through the formation of a ‘... worldwide network of its managers and technical experts to find and use best practices’ (1998, p. 160) a common vocabulary and language enabled the organisation to identify and share what worked and what did not work, assisted by ‘... sharing sessions and ... special classes and outside speakers’ (1998, p. 161). Similarly, the Project Management Body of Knowledge offers a communication model for project managers to encode messages so they can ‘... facilitate communications and the exchange of information’ (Project Management Institute 2013, p. 293).

The development of a knowledge exchange instrument was based on the stated desires of the research participants for a simple, easy-to-use approach to refer to when exchanging knowledge in the workplace. This use of a diagram with symbols and questions fits within what Kuhn (1970) suggests are ‘... preferred or permissible analogies and metaphors’ (1970, p. 184). I designed the knowledge exchange instrument based on my experience, input from the research participants, and the external reference group so it could be employed in any environment,

*‘... where people continually expand their capacity to create the results they truly desire, where new and expansive patterns of thinking are nurtured, where collective aspiration is set free, and where people are continually learning to see the whole together’ (Senge 1990, p. 3).*

### **3.7 Data Collection and Analysis**

To collect and analyse the data I modified several grounded theory techniques adapted to an action research context. I designed a four step approach to collect, analyse, and examine, confirm and extend theory, while collecting reflections. The adapted data collection and analysis process is based on the approaches developed by Charmaz (1990); Douglas (2003); Glaser (1992); Glaser and Strauss (1967); Mintzberg (1979); Strauss (1987), and Strauss and Corbin (1990, 1998). The flexibility needed during the action research cycles was within the grounded theory premise of being able to ‘... affirm, check, and refine their developing ideas’ (Charmaz 1990, p. 1162). However my approach differed as ‘... the purpose of grounded theory is theory construction, rather than description or application of existing theories’ (Charmaz & Bryant 2011, p. 292). As I was confirming and extending existing theories relevant to this study, not generating a substantive theory, the fourth step in my approach was a modification of grounded theory (Glaser & Strauss 1967). The four step approach I developed is overlaid on to the action research cycles at each intervention in the study and as depicted in Figure 14 below, and the detailed data collection and analysis approach is depicted in Figure 15 following.





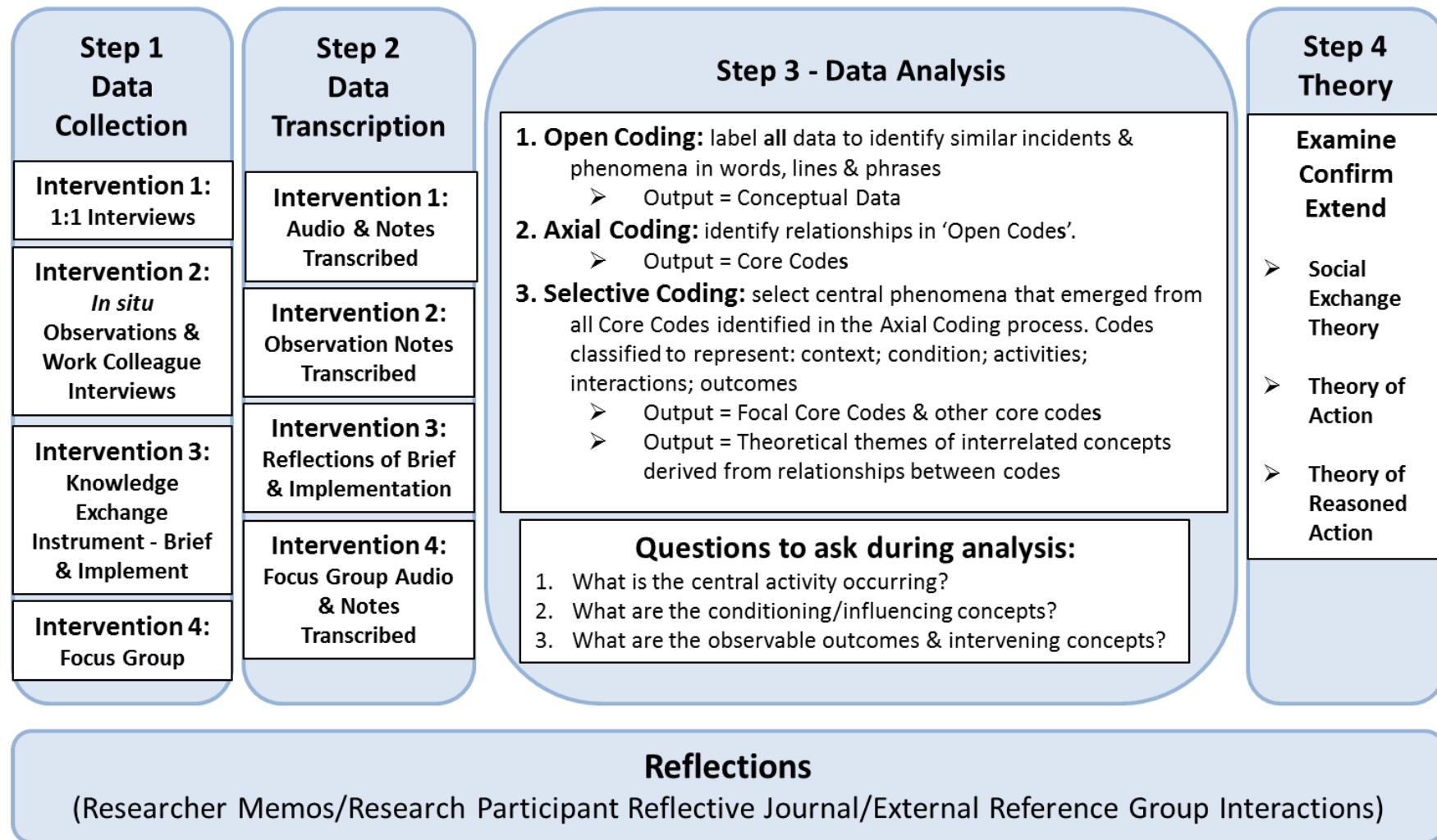


Figure 15: Data collection, analysis and theory examination steps

The first step to collect the data was through conducting interviews, observations, and a focus group. This step is underpinned by the action research spiral where the three cycles frame the interventions with the first cycle used to examine the existing situation through interviews and observations. The second cycle is where a change is implemented, using the knowledge exchange instrument, and the third cycle is where the change is evaluated by the research participants in a focus group meeting. The additional spin-off cycles involve meetings with the external reference group and my personal reflections. The second step is to transcribe the data collected through digital recordings and my field notes into MSWord files for ease of analysis for transferral to other software programs as necessary. The third step requires the use of techniques used in grounded theory to analyse the data (Charmaz 2006; Glaser 1978; Strauss & Corbin 1998). The fourth step will see the examination, confirmation and extension of existing theories related to the exchange of knowledge. I deliberately analysed the data before exploring the theories to allow them to emerge from the data. The approach used to collect and analyse the data is carefully documented to enable replication and backed up in other environments.

The action research approach used four interventions which were designed to understand how the research participants acquired and exchanged knowledge in their workplace environment. The tools and techniques they use to exchange knowledge were also specifically noted. The four interventions required both myself and the research participant to follow a pre-determined structure, as shown in Figure 14 (Piggot-Irvine 2001), to allow the results to be explored and analysed using the same grounded theory technique.

The data was collected using a ‘... systematic approach [that] extends to sampling, data collection, and particularly interpretation. This helps to improve efficiency and reduce bias’ (Dick 1998, p. 2). There were three approaches used to collect the data. The first was the use of interviews with each research participant where I followed Dick’s (1998) approach to:

*‘... first put the person at ease. When you’ve established rapport, ask a single, broad question. Then keep the person talking for as long as you can, about one hour or a little longer. Then and only then ask any specific questions’ (Dick 1998, p. 1).*

I then followed the broad question about how the research participant became a project manager with five targeted questions about the research participant’s education, experience, memberships, current knowledge exchange practices and their behaviours when they exchange knowledge. The potential limitation of using interviews, as with most forms of data

collection, is I may not have asked the right questions. I reduced this risk by setting highly structured questions which were reviewed in a pilot study with three project managers prior to the first interviews being conducted. I initially learnt the interview questions were too narrow and I needed to allow sufficient time for the person being interviewed to explore different themes within the topic of their choosing. Adjustments were made to allow for more open interview questions and more time, and the information gathered was systematically analysed to inform subsequent interactions with the research participants.

The second method of collecting data was through structured observations of the research participants in their workplace. They were observed in meetings, on site visits, in social surroundings or in their office. I recorded the observations on a worksheet using a legend based on planned observation protocol codes to note their actions and interactions during a typical working day. A protocol sheet is included in Appendix 2–OF to demonstrate this approach to collecting data during intervention two. The interviews with the research participants' work colleagues were also transcribed and compared to what their colleague said they actually did. This technique was derived from the Kotter (1999a, 1999b) and Mintzberg (1980a) research process into what managers and leaders said they did and what they actually did in the workplace.

The third method of collecting data was through the information entered in the research participants' reflective journals. A framework for recording their thoughts about knowledge exchanges was presented at the first intervention with clear instructions on how to input data, and subsequently when they implemented the knowledge exchange instrument. The final data collection activity was to conduct a focus group meeting with the research participants after the knowledge exchange instrument was implemented. The focus group meeting was designed to identify how they used the knowledge exchange instrument in their workplace. The focus group meeting was recorded and transcribed, in addition to the written notes I took of the conversation and interactions during the meeting.

The data collected during the interventions was transcribed from the digital recordings, handwritten notes, memos, and both the research participants' and my reflective journals. The transcriptions occurred within several days of each interaction, and the reflective journals were transcribed for analysis after all the interventions had finished. The memos were written after each intervention and added to as concepts and ideas emerged, and were referred to when analysing the data. To analyse the data, selected techniques from grounded theory were used to code it, leading to the examination, confirmation and extension of relevant theories.

Reflections were captured as I analysed the data, to allow categories and concepts to emerge using relational statements.

The data was examined to assign 'Open Codes' through summarising key words, sentences and phrases. The data was labelled to identify similar incidents and phenomena resulting in 'Conceptual Data'. 'Axial Codes' identified the relationships between the various 'Open Codes', resulting in 'Core Codes'. During all of these procedures, I kept written memos in a notebook and used a reflective journal. These were to review each process, guide and instigate improvements between the interventions, and discuss where relevant with the external reference group. The analysis of the data is described in detail in 'Chapter 4: Data Collection and Analysis'.

### ***3.8 Quality***

The research paradigm described in this chapter in 'Section 3.3 Research Paradigm' positions the research as interpretivist, where the world is described as complex and dynamic and is constructed, interpreted and experienced by people in their interactions with each other and with wider social systems. As such,

*'... how respectfully the inquiry is carried out, how persuasively the arguments are developed in the written account, and how widely the results are disseminated become much more important issues than any criteria based process of accounting that occurs after the research is completed' (Angen 2000, p. 387).*

The use of multiple sources of information as well as overlapping data from a single research participant, provide rigour to validate the research (Dick 1999b).

To demonstrate quality in the naturalistic setting typical of action research sites, I referred to Guba and Lincoln's (1982) criteria to develop a trustworthy approach to the research. Table 12 presents Guba and Lincoln's (1982) comparison between the naturalistic approach to research, including a translation into rationalistic terms.

Table 12: Methods of trustworthiness between naturalistic and rational research  
(Guba & Lincoln 1982, pp. 246-9)

Four Naturalistic Questions	Rationalist 'Translation' of the four Naturalistic Questions	Methods to Manage Trustworthiness of Naturalistic inquiries
<p><b>1. Truth Value</b> How can one establish confidence in the truth of the findings of a particular inquiry for the respondents with which and the context in which the inquiry was carried out?</p>	<p><b>1. Credibility</b> Internal validity is demonstrated through 1:1 correspondence between the data sets of an inquiry and the phenomena that the data represents.</p>	<p><b>1. Internal Validity</b> To ensure credibility, conduct and continually test for:</p> <ul style="list-style-type: none"> <li>• prolonged engagement at a site</li> <li>• persistent observation</li> <li>• peer debriefing</li> <li>• triangulation</li> <li>• references to the adequacy of materials</li> <li>• member checks</li> </ul>
<p><b>2. Applicability</b> How can one determine the degree to which the findings of a particular inquiry may have applicability in other contexts or with other respondents?</p>	<p><b>2. Transferability</b> In the rationalistic paradigm, external validity is demonstrated by the data being collected from a sample that is representative of the target population.</p>	<p><b>2 External Validity</b> To ensure transferability, engage in or provide the following:</p> <ul style="list-style-type: none"> <li>• theoretical/purposive sampling</li> <li>• thick description</li> </ul>
<p><b>3 Consistency</b> How can one determine whether the findings of an inquiry would be consistently repeated if the inquiry were replicated with the same (or similar) respondents in the same (or a similar) context?</p>	<p><b>3. Dependability</b> The study can be repeated under the same circumstances in another place and time.</p>	<p><b>3 Reliability</b> To ensure dependability, conduct the following:</p> <ul style="list-style-type: none"> <li>• use of overlap methods, one kind of triangulation process</li> <li>• stepwise replication, split inquirers and data sources into two roughly equal halves to be investigated</li> </ul>

Four Naturalistic Questions	Rationalist 'Translation' of the four Naturalistic Questions	Methods to Manage Trustworthiness of Naturalistic inquiries
		independently <ul style="list-style-type: none"> <li>• a dependability audit</li> </ul>
<b>4 Neutrality</b> How can one establish the degree to which the findings of an inquiry are a function solely of respondents and of the conditions of the inquiry and not of the biases, motivations, interests, perspectives, and so on, of the inquirer?	<b>4 Confirmability</b> Based on a quantitative notion of inter-subjective agreement  With the onus of objectivity removed from the inquirer and placed on the data.	<b>4 Objectivity</b> To ensure confirmability, conduct the following: <ul style="list-style-type: none"> <li>• triangulation</li> <li>• practice reflexivity to identify assumptions, biases, or prejudices</li> <li>• a confirmability audit</li> </ul>

The publication of a Handbook of Action Research (Reason & Bradbury, 2001) marked ‘... a turning point in the development of AR, [as] the handbook made quality an issue both as a topic and through the quality of its chapters’ (Dick 2004, p. 426). Using this handbook, and the quality strategies proposed by Altrichter (1999) I developed a range of quality strategies for the action research study as depicted in Table 13 below.

Table 13: Quality strategies for this action research study

Quality Strategies (Altrichter 1999, pp. 5-9)	Quality Strategies for this Research
1. Data is 'confronted' from different perspectives.	<ul style="list-style-type: none"> <li>• Designed four interventions combining interviews, observations and a focus group meeting.</li> </ul>
2. Closely and iteratively link reflection and action.	<ul style="list-style-type: none"> <li>• I kept a reflective journal to review and modify actions as required.</li> </ul>
3. Incorporate reflection with the development of educational values.	<ul style="list-style-type: none"> <li>• Research participants used reflective journals.</li> </ul>
4. Undertake holistic, inclusive reflection.	<ul style="list-style-type: none"> <li>• The focus group meeting offers a collective way to reflect on the research.</li> </ul>
5. Research and development of one's own self-concept and competency.	<ul style="list-style-type: none"> <li>• I established an external reference group to review my own assumptions and test developments.</li> </ul>
6. Inserting individual findings into a critical, professional discussion.	<ul style="list-style-type: none"> <li>• I have and will continue to publish the de-identified results of the research in the academic and professional communities.</li> </ul>

The use of action research cycles to intervene at predetermined points in time creates the opportunity to reflect and gradually refine and test the approach and questions, while collecting multiple sets of data. This reflective approach is shown in the work of Sarah et al. (2002) to align three levels of reflection to the Framework, Methodology, and Area of Concern (FMA) model (Checkland & Scholes 1990, p. 283) in 'Section 3.5.1 Methodological Models'. The three levels of the FMA model are defined as:

*'When we reflect on content, we are reflecting on what happened in the action area (A); process reflection maps to the choice of how we applied our methodology (M); while premise reflection suggest that we explore why we chose to do what we did in the way we did it as a reflection of our framework of ideas (F)' (Sarah et al. 2002, p. 537).*

The examination of the data focused only on what was currently being collected and compared to previous intervention/s. This method offers an ability '... to test any emerging agreement and to explain any emerging disagreements' (Dick 1999a). Further, I embedded choice-points



proposed by Bradbury and Reason (2006) for action researchers to improve the quality of their work. The choice-points formed for the research are described in Table 14 below.

*Table 14: Quality choice-points*

<b>Choice-points</b> (Bradbury & Reason 2006, p. 350)	<b>Quality Choice-points for this Research</b>
1. Explicit development of a standard way for the researcher to relate to the subject.	<ul style="list-style-type: none"> <li>• Developed research protocols, and undertook multiple discussions around confidentiality with the research participant.</li> </ul>
2. Guided by thoughtful concern for practical outcomes.	<ul style="list-style-type: none"> <li>• Designed the research to address concerns about project knowledge and how the research would contribute to improve a project manager's practice.</li> </ul>
3. Inclusive of more than one way of knowing, through: <ol style="list-style-type: none"> <li>a. Ensuring the concepts and ideas are honest</li> <li>b. Embracing ways of knowing beyond the intellect</li> <li>c. Intentionally choosing appropriate research</li> </ol>	<ul style="list-style-type: none"> <li>• To explore the research paradigm, I examined three perspectives of knowing: the ontological view; the epistemological view; and the methodological view. These perspectives led to the intentional choice of an action research methodology.</li> </ul>
4. Worthy of the term 'significant'	<ul style="list-style-type: none"> <li>• The development of a specific action research methodology used to address an area of concern.</li> </ul>
5. Emerging towards a new and enduring infrastructure	<ul style="list-style-type: none"> <li>• Demonstrated use of an action research methodology in a project management context to address knowledge acquisition and exchange.</li> </ul>

To meet these quality requirements, I ensured '... rigour and credibility in the knowledge or theory generated through real life interventions' (McKay & Marshall 2001, p. 57) was embedded in all research activities. I deliberately planned '... for robust methods and trustworthy results, and for ethical character in the planning, conduct and reporting of research' (Piggot-Irvine & Bartlett 2008, p. 22) through the development of a purposeful research approach. This approach was reviewed by the external reference group and the research Supervisors at regular intervals and a research pilot was conducted before each

intervention. An ethical approach to the research process was observed, with further details in this chapter in 'Section 3.8.3 Ethical Considerations'.

### 3.8.1 External Reference Group

Throughout the research, the process of review and reflection was undertaken by three parties—myself, an external reference group, and the research participants. In this section I will describe the formation of the external reference group and the reasons they were involved in the study.

After a discussion with an esteemed academic colleague, the idea of an additional spin-off cycle to validate and test the interventions using a third party was raised. This additional cycle was thought to add a level of rigour to the original action research model by adding both external and internal reflection cycles. In addition, the combined expertise of the external reference group was a valuable source of information, and ultimately served to extend my knowledge. Researcher reflections were added to review feedback from the external reference group prior to each intervention. In addition, information from my own reflective journal was included in these reflections to prepare for subsequent interventions. The sequence of these reflections is depicted in Figure 16 below.

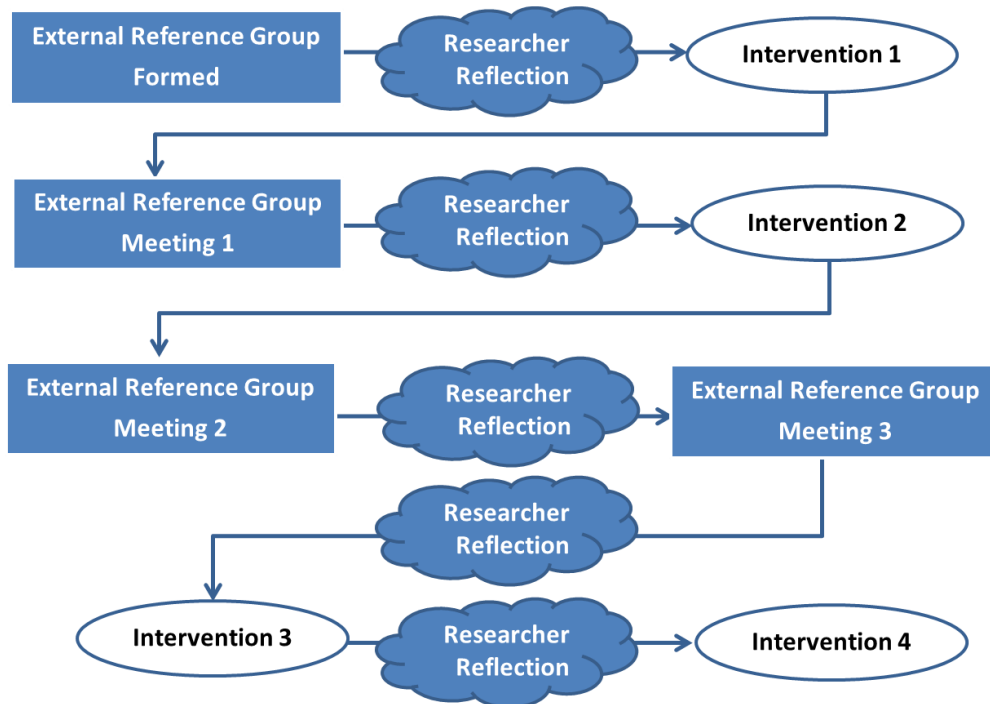


Figure 16: External reference group and researcher reflection sequence

The members of the external reference group were selected from a small pool of highly respected sectors across project management to represent professional associations, academia and the project management practitioners. Meetings were conducted via teleconference with the agenda being supplied to the external reference group members a week prior to the meeting. The outcomes from the meeting were recorded, minuted and captured in my reflective journal. Actions from the first meeting were addressed in the second meeting and prior to and after the third intervention the external reference group were consulted. Analyses of the reflections from the meetings are outlined in 'Chapter 4: Data Collection and Analysis'.

The formation of the external reference group started with a review of the most appropriate representatives from academia, industry, and the professional associations. I contacted people who, from my experience and involvement in these sectors for over 20 years, were able to fulfil the requirements of providing their time and valued advice for the research. I have included a brief profile of each person as background to their involvement, which is described later in this section.

## **External Reference Group Member Profiles**

To ensure anonymity for the members of the external reference group I used the following North Atlantic Treaty Organization (NATO) phonetic alphabetical names to represent their background and role in the group. The names are Alpha for the Academic representative; India for the Industry practitioner; Papa-Mike for a combination of academic, practitioner and a Project Management Association representative; and Papa-Alpha for the second Project Management Association representative.

### **Academic:**

Alpha is a retired academic in the field of education, and continues to consult in the creation and management of high energy learning environments using, in particular, action and experiential learning simulations and games. Alpha is an experienced communicator and learning facilitator, working in multicultural contexts, presenting keynote addresses, and publishing books and articles. Alpha's extensive experience in this area gave the external reference group a deep academic perspective, combined with current industry experience.

### **Practitioner:**

India is the Director of global business at an international, Australian based engineering project management organisation, having held positions as Chair and Managing Director over 35 years with that organisation. India has been extensively involved in commercial and public projects and as an expert witness in construction arbitration, in Australia and overseas. India is an Adjunct Professor at an Australian university, a Life Fellow with the Australian Institute of Project Management (AIPM) and an Honorary Associate Graduate from the School of Government at another leading Australian university. India has also been a contributing author for three project management books published by McGraw Hill in the USA, combined with India's extensive experience, generating a robust understanding when reviewing the research approach.

**Academic, Practitioner and Professional:**

Papa-Mike held the position of National President of a leading project management association in Australia for eight years and is currently a member of the Research Management Board of an international project management association, a global advisor to a leading online project management journal, and a Professor at an engineering and science oriented technical university in Beijing, China. Papa-Mike has over 30 years experience managing chemical processing and mining projects in Australia, Europe, Asia, North America, and Africa, which, together with highly esteemed roles with the professional associations, as well as his academic background, offered valuable input to the external reference group.

**Professional:**

Papa-Alpha was the Sydney Chapter President for a leading international project management association and was recognised with significant awards in project management for that association in 2009. Papa-Alpha has also led a project management youth outreach program in Australia. Papa-Alpha's extensive experience delivering complex, multiple multi-million dollar projects in the IT, Telecommunications, banking and insurance industries and part time lecturing in project management, also offered the necessary background to participate in the external reference group.

### **3.8.2 Data Storage**

The data is stored in a secure drive at the University of Technology, Sydney (UTS) and backed up weekly on an external secure drive. The reflective journals the research participants prepared were scanned and returned to them, with a copy of the transcription and analysis stored securely as with all the research documents. All other records, physical or virtual are to be retained in a secure manner in compliance with the policies of the University of Technology Sydney.

### **3.8.3 Ethical Considerations**

To be effective, the action researcher needs to identify the '... issues and problems in action research which require an ethical code of practice to be negotiated between the researcher and the research participants' (Meyer 2000, p. 9). Through negotiation, research participants and I had a clear understanding of what we both agreed to deliver within the constraints of the environment in which the research was to be conducted. These constraints included the requirement for the research proposal to be reviewed by an independent Ethics Committee at UTS and to meet the following codes of ethics stipulated by professional associations and the Australian Government:

- The research was conducted with respect to the ethical responsibilities of human research within UTS guidelines and was approved by the Ethics Committee. These guidelines are based on the Australian Code for the Responsible Conduct of Research (Australian Government 2007, p. 9), and require researchers to undertake their research with honesty and integrity.
- Respect for human research participants, animals and the environment.
- Good stewardship of public resources used to conduct research.
- Appropriate acknowledgment of the role of others in research.
- Responsible communication of research results.

The management of ethical issues was included in the submission of the UTS Human Research Ethics Committee Application (HREC) reference number UTS HREC 2001-158A with approval given to proceed with the research in June 2011.

When conducting an action research project, ethical issues can be more challenging as the researcher takes the position often jointly with the research participants, their employers and

organizations. This form of research raises ethical considerations identified by Holian and Brooks (2004) to include:

- 'i) The nature of the information or data of interest, who 'owns' this, and who can 'release' it for the research purposes requested;
- ii) The nature of the relationship between the 'human subjects' who may potentially be involved in the research and the 'researcher';
- iii) The nature and extent of the level of informed consent and freedom to choose not to participate in events or behaviour that may be part of 'normal' work, that could later be included in that selected to be included in the 'research' or research publications; and
- iv) The nature and extent of anonymity and confidentiality for individuals and the organisation, including between potential participants or 'human subjects' involved in 'normal' meetings or 'special' group discussions for research purposes' (Holian & Brooks 2004, p. 6).

The researcher also needs to consider other issues leading to '... negative or even dangerous outcomes for organisations and individuals' (Holian & Brooks 2004, p. 6) as a result of unexpected developments.

When the research was being conducted, I needed to develop and maintain a trusting relationship with the research participants to ensure the changes that may have occurred in their practice as a result of the interventions are not threatening to themselves or their employer. Trust is core to action research as it describes the '... honesty, and respect [which] are pre-conditions of the search for truth/truths' (Zuber-Skerritt 2005, p. 54). The establishment of trust was formalised using documented consent forms and codes of conduct and through informal behaviours and reassurances of the confidentiality and anonymity of the research participant's involvement in the research.

The major ethical issues identified as potential risks during the course of the research have been outlined in Table 15 below. These ethical issues were analysed and mitigation strategies developed.

Table 15: Ethical Considerations for Research

Ethical Consideration	My Mitigation Strategies
Selection of project managers without bias to the researcher.	Develop appropriate selection criteria to ensure a purposeful set of research participants is available.
Interaction with project managers to ensure ongoing participation and integrity of their contribution.	Prepare a letter of consent to manage expectations, ensure confidentiality and allow for withdrawal.
Potential bias of the researcher who may use inductive reasoning to induce, lead or influence the research participant.	If the research participants request to leave the research, ask them to give notice of withdrawal and develop a structure to seek their consent not to destroy any data that has already been analysed and synthesized.
The privacy and confidentiality of the reflective journal as they will be read and may describe both positive and negative (possibly stressful) experiences with knowledge sharing.	Ensure the research method is robust and identifies the required interventions and my, and the research participants', responsibilities.

### 3.9 Summary

To understand the research methodology and methods developed for this study, the research questions were developed within an interpretivist research paradigm and within an action research framework. To identify how project managers acquire and then exchange project management knowledge in an Australian context I needed to develop an approach to plan, act, observe, and reflect in iterative cycles. The development of a research approach based on this cyclical premise involved a series of interventions designed to examine the existing situation, implement a change and then evaluate the change. As these cycles spiralled towards the final examination, there were a series of spin-off cycles involving the external reference group which offered additional insights throughout the action research cycles. The research participants involved in the research represented a selection of experienced project managers working on a range of projects in Australia. The research participants were interviewed and observed by me, completed reflective journals, and attended a focus group meeting to share how they used a knowledge exchange instrument in their workplace. Two reflective journals were completed by the research participants to offer a personal perspective on knowledge

exchange. I also interviewed the research participants' work colleagues to generate additional perspectives to understand how the research participants exchanged knowledge. The data collected during the interventions was analysed according to a four-step approach and quality was assured through adherence to consistent, repeatable approaches, including the storage of the data, and defined ethical standards. In sum, the alignment of an appropriate action research methodology, with innovative elements such as the highly qualified external reference group, created a robust research method to capture and explore how Australian project managers acquire and exchange knowledge in the workplace.



### ***3.10 Appendices***

The following table presents a description of the protocol used to delineate the headings for the appendices so they succinctly align to specific sections of the research method.

<b>Appendix Heading</b>	<b>Description</b>
Appendix 1–RPI	Intervention <b>1</b> , <b>R</b> esearch <b>P</b> articipant Interview Questions
Appendix 1–RJ	Intervention <b>1</b> , <b>R</b> eflective <b>J</b> ournal
Appendix 2–OP	Intervention <b>2</b> , <b>O</b> bservation <b>P</b> rotocol
Appendix 2–OF	Intervention <b>2</b> , <b>O</b> bservation <b>F</b> orm
Appendix 2–WCI	Intervention <b>2</b> , <b>W</b> ork <b>C</b> olleague Interview Questions
Appendix 2–RJ	Intervention <b>2</b> , <b>R</b> eflective <b>J</b> ournal
Appendix 3–KEI	Intervention <b>3</b> , <b>K</b> nowledge <b>E</b> xchange Instrument instruction card
Appendix 4–FG	Intervention <b>4</b> , <b>F</b> ocus <b>G</b> roup Questions

## **Appendix 1–RPI**

### ***Intervention 1 Research Questions***

The following questions will be asked of the research participants during a one hour face-to-face interview at the participant's work location. Preparation for the interview will involve reminding the participant of the confidentiality of their answers, the information is being recorded and they can stop the interview at any time if they feel uncomfortable.

#### **Section 1: Opening Questions**

##### **1.1 Background of Participant**

- 1.1.1 Name:
- 1.1.2 Title:
- 1.1.3 Company:
- 1.1.4 Qualifications and/or certifications:

#### **Section 2: Research Questions**

##### **1.2 Explanation of Project Management Skills and how they were obtained**

###### **Open Question:**

- 1.1.1 Tell me something about how you became a project manager? (25-30mins)

###### **Focused Questions:**

- 1.1.2 Education—what significance did formal project management training have on your development as a project manager?
- 1.1.3 Experience—how do you gain your project management experience?
- 1.1.4 Memberships—what is the value of project management associations in your professional development?
- 1.1.5 Knowledge—can you tell me something more about how you exchange knowledge on your projects and across the organisation?
- 1.1.6 Behaviour—what is the significance of interpersonal relationships and the organisational climate in exchanging knowledge?

#### **Section 3: Reflective Journal**

Give the research participant their personal reflective journal and go through the instruction sheet.

#### **Section 4: Close Interview**

To close the interview the researcher will invite the participant to summarise the key points for the interview in order of priority. The researcher will then remind the participant about the confidentiality of the information and the analysis will result in the development of a knowledge exchange instrument which will be brought to the next interview to begin implementing.

#### **Section 5: Post Interview**

Analyse the data after the intervention to determine any commonality.

## Appendix 1–RJ

### Intervention 1–Reflective Journal Instructions

The following questions need to be addressed regularly to ensure your reflective journal captures how you are exchanging knowledge on your project/s. Ideally you will keep a record of your experiences in the workplace as evidence of exchanging knowledge.

After you have completed the four questions in one sitting, five times, you will be required to review your reflections as a way of analysing your overall experiences to demonstrate a larger understanding of how you have exchanged knowledge. In this analysis we would like you to generate commentary on any common threads, themes or recurring thoughts and actions.

Asking yourself ‘Why’ up to five times after each journal entry will elicit underlying patterns and reasoning.

### *Journal Entries*

#### 1. What have I learned today?



Reflect on the main points and observations. What did I find most challenging and why?

#### 2. How did I create this new knowledge?



Reflect on how I created this knowledge—was it an original idea, information supplied by a colleague or something I heard or read or observed?

#### 3. What will I do with this new knowledge?



Reflect on how I will apply this new knowledge to my projects. How will I do this—note specific actions.

#### 4. What is the impact of this new knowledge?



Reflect on the implications for me, my team/s and my organisation. What do I need to start doing, do more of, do less of, or stop doing?

### *Review–What Have I Learned?*

After completing the four questions in one sitting, five times, in your reflective journal, reflect on what you have already written since your last Review and identify any common threads, themes or recurring thoughts and actions.

Reflect on the most important insights or learnings from a **personal** and **organisational** perspective.

### *Contacts*

If I have any questions I can contact either the Researcher, Chivonne Algeo on +61(0) 2 9514 8727 or +61(0) 401 993 198 or her Research Supervisor, Dr. Shankar Sankaran on +61(0) 9514 8882 or +61(0) 406 137 325.

## Appendix 2–OP

### *Intervention 2–Observation Protocol*

The following points will be completed by the researcher during the Observation Day with the research participant. An initial discussion will take place at the beginning of the day to describe the process of gathering data. The researcher will then follow the research participant and record observations according to the codes described in Section 2. During the Observation Day a colleague selected by the research participant will be interviewed and recorded to gather data on how the research participant is sharing knowledge from the perspective of the Third Party.

#### **Section 1: Opening Questions**

##### **1.1 Participant Update**

Ascertain if the research participant’s details have changed since the first intervention, such as, are they working with the same company, in the same position, have they undertaken any additional training, joined an association or taken on a new project/s.

##### **1.2 Definition of Knowledge Exchange and Instrument Design**

Give the research participant a broad definition of knowledge exchange so they understand what the researcher will be keen to observe:

*‘Knowledge exchange is a deliberate interaction between decision makers and other individuals or groups of people who are working together to achieve an outcome. It may result in mutual learning through the process of problem-solving in a structured or unstructured way. The outcome of the learning may involve the creation of knowledge through ‘... a systematic approach to capture, collect and share tacit knowledge in order for it to become explicit knowledge’ (Government of Alberta, 2004).*

The research participant is to be asked to articulate what they want, what they would not find beneficial, and how they would use a knowledge exchange instrument. The discussion is also to revisit what the research participant had said in their first interview in regard to how they exchanged knowledge. The aim of involving the research participant in the overall design of the knowledge exchange instrument is to ensure maximum uptake of the tool.

#### **Section 2: Observation**

**Observe:** How the research participant exchanges knowledge during the day using the codes below. In hourly blocks the researcher will describe the relationship between the research participant and the receiver of the information, where the exchange took place, how long it took and what the outcomes were from the exchange.

##### **Interaction Type**

Following is a possible list of the types of interactions to be aware of during the observation:

### Informal

Code	Type	Definition and examples
IfVD	Verbal–Distant, i.e. not face-to-face	<i>Examples: phone calls, Skype calls with no visual</i>
IfVF	Verbal–Face-to-Face	<i>Examples: corridor discussions, Skype calls with video</i>
IfDH	Documents–hard copy	<i>Examples: journals, own notes</i>
IfDS	Documents–soft copy	<i>Examples: e-mails, intranet, SharePoint or other web-based portal</i>
IfSM	Social Media	<i>Examples: microblog, podcast, vodcast, wikis, twitter, texts, Facebook</i>

### Formal

Code	Type	Definition and examples
FVD	Verbal–dialogue	<i>Examples: teleconferences, video conferences</i>
FVF	Verbal–Face-to-Face	<i>Examples: meetings, presentations</i>
FDH	Documents–hard copy	<i>Examples: reports</i>
FDS	Documents–soft copy	<i>Examples: emails, intranet, SharePoint or other web-based portal</i>

### Direction of Exchange

Code	Type	Definition
RI	Received (in)	The person/people who were the target of or receivers of the information being exchanged
TO	Transmitted (out)	The person/people who were providing the information in the exchange
RT	Both	The two way exchange of information by both the receiver and the transmitter

### Outcome of Exchange

Code	Type	Definition
EA	Engaged and Accepted	The exchange between the party/ies was demonstrated to be active and in agreement
ENA	Engaged and Not accepted	The exchange between the party/ies was demonstrated to be active and NOT in agreement
NE	Not Engaged	The exchange between the party/ies was demonstrated to be inactive and therefore could be assumed to not be in agreement
EO	Exchange Other	A different exchange not anticipated

### Relationship to Party/ies

Following is a list of the types of people the research participant may interact with during the Observation Day and a definition of the type.

Internal		External	
Code	Type	Code	Type
It-2	Two levels below self	Ex-2	Two levels below self
It-1	One level below self	Ex-1	One level below self
It0	Self	Ex0	Self
It+1	One level above self	Ex+1	One level above self
It+2	Two levels above self	Ex+2	Two levels above self

### Section 3: Third Party Interview

Refer to separate attachment for the instruction sheet.

### Section 4: Reflective Journal

Ask the research participant how they have been managing the entries in the first set of pages in their reflective journals. Give the research participant a second set of reflective journal pages and go through the instruction sheet.

### Section 5: Close Interview

To close the observation day the researcher will invite the research participant to summarise the key outcomes of the observation day in order of priority. The researcher will then remind

the research participant about the confidentiality of the information and the work they have done with the researcher would result in the development of a knowledge exchange instrument which will be emailed to them in the following month for implementation.

### **Section 6: Post Interview**

Analyse the data after the intervention to build common themes to the interview data and develop separate findings on knowledge exchange.

## Appendix 2–OF

### *Intervention 2–Observation Form Example*

<b>Contact Type:</b>	Observation Day - Notes	<b>Date of Contact:</b>	Wednesday 23 November 2011
<b>Participant Name:</b>	Delta	<b>Time of Contact:</b>	9:00am–5:00pm
<b>Site:</b>	Delta’s office	<b>Today’s Date:</b>	Wednesday 30 November 2011

### Communication Type

Informal		Formal		Direction of Exchange		
Code	Type	Code	Type	Code	Type	Definition
IfVD	Verbal–Distant, i.e. not face-to- face	FVD	Verbal– dialogue	RI	Received (in)	The person/people who were the target of or receivers of the information being exchanged
IfVF	Verbal–Face-to- Face	FVF	Verbal–Face- to-Face	TO	Transmitted (out)	The person/people who were providing the information in the exchange
IfDH	Documents–hard copy	FDH	Documents– hard copy	RT	Both	The two way exchange of information by both the receiver and the transmitter
IfDS	Documents–soft copy	FDS	Documents– soft copy			
IfSM	Social Media					



### Relationship to Party/ies

Following is a list of the types of people the research participant may interact with during the Observation Day and a definition of the type.

Internal		External	
Code	Type	Code	Type
It-2	Two levels below self	Ex-2	Two levels below self
It-1	One level below self	Ex-1	One level below self
It0	Self	Ex0	Self
It+1	One level above self	Ex+1	One level above self
It+2	Two levels above self	Ex+2	Two levels above self

Open Coding		
Who, What, When, Where, Why, How....What if....'Always'....'Never'....		
Times	Line-by-line	Shorter Code Phrases
9.30– 10.00 am	Review–update–structure of day–Delta gave me a copy of diary - general discussion.	
10.00– 10.30am	<b>Interaction Type: FVF</b> <b>Direction of Exchange: RT</b> <b>Relationship: IT +1</b> Observation notes removed to maintain confidentiality.	Shorter code phrases removed to maintain confidentiality.
10.30– 11.00am	<b>Interaction Type: FVF</b> <b>Direction of Exchange: RT</b> <b>Relationship: IT +1</b> Observation notes removed to maintain confidentiality.	Shorter code phrases removed to maintain confidentiality.
11.00– 11.30am	<b>Interaction Type: FVF</b> <b>Direction of Exchange: RT</b> <b>Relationship: IT +1</b>	Shorter code phrases removed to maintain confidentiality.

	Observation notes removed to maintain confidentiality.	
11.30– 12.00nn	<p><b>Interaction Type: FVS</b></p> <p><b>Direction of Exchange: RT</b></p> <p><b>Relationship: I T–1</b></p> <p>Observation notes removed to maintain confidentiality.</p>	Shorter code phrases removed to maintain confidentiality.
12.30– 1.00pm	Went to cafe/lunchroom.	
1.00– 2.00pm	<p><b>Interaction Type: FVF</b></p> <p><b>Direction of Exchange: RT</b></p> <p><b>Relationship: IT +1</b></p> <p>Observation notes removed to maintain confidentiality.</p>	Shorter code phrases removed to maintain confidentiality.
2.00– 3.00pm	<p><b>Interaction Type: FVF</b></p> <p><b>Direction of Exchange: RT</b></p> <p><b>Relationship: 4xlt 0, 1xlt–1, Delta, Craig, Margaret</b></p> <p>Observation notes removed to maintain confidentiality.</p>	Shorter code phrases removed to maintain confidentiality.
3.00– 4.00pm	<p><b>Interview with Work Colleague</b></p> <p>Observation notes removed to maintain confidentiality.</p>	Shorter code phrases removed to maintain confidentiality.
4.00– 4.30pm	<p><b>Interaction Type: FVF</b></p> <p><b>Direction of Exchange: RT</b></p> <p><b>Relationship: 4xl + 1 / 2, 2x It–1, Delta</b></p> <p>Observation notes removed to maintain confidentiality.</p>	Shorter code phrases removed to maintain confidentiality.
4.30– 5.00pm	<p><b>Interaction Type: FVF</b></p> <p><b>Direction of Exchange: RT</b></p> <p><b>Relationship: 3x I+2, 1x It–1, Delta</b></p>	Shorter code phrases removed to maintain confidentiality.

	Observation notes removed to maintain confidentiality.	
5.00– 5.30pm	Reviewed day–discussed knowledge exchange from intervention one as a base to discuss knowledge exchange tool requirements–closed.	

## **Appendix 2–WCI**

### ***Intervention 2–Work Colleague Research Questions***

The following questions will be asked of a work colleague of the research participant during a one hour face-to-face interview at their work location. Preparation for the interview will involve asking the work colleague to sign a consent letter, reminding the work colleague of the confidentiality of their answers, the information is being recorded and they can stop the interview at any time if they feel uncomfortable.

#### **Section 1: Opening Questions**

##### ***1.1 Background of Work Colleague***

- 1.1.1 Name:
- 1.1.2 Company:
- 1.1.3 Title:
- 1.1.4 Relationship to research participant:
- 1.1.5 Qualifications and/or certifications:

#### **Section 2: Research Questions**

##### ***1.2 Explanation of how the research participant Exchanges Knowledge***

###### **Open Question:**

- 1.1.6 Tell me something about how you share knowledge and possibly learn from the research participant? (25-30mins)

###### **Focused Questions:**

- 1.1.7 Experience—how does the research participant share their project management experience?
- 1.1.8 Knowledge—can you tell me how the research participant exchanges knowledge on your projects and across the organisation?
- 1.1.9 Behaviour—how does the research participant manage interpersonal relationships in the organisation to exchange knowledge?
- 1.1.10 Open—have you any other information you can share with me to help me understand the way the research participant exchanges their knowledge?

#### **Section 3: Close Interview**

To close the interview the researcher will invite the Third Party to summarise the key points of the interview in order of priority. The researcher will then remind the Third Party about the confidentiality of the information and the analysis will result in the development of a knowledge exchange instrument which will be implemented by the research participant.

#### **Section 4: Post Interview**

Analyse the data after the intervention to determine any commonality.

## **Appendix 3–KEI**

### ***Intervention 3–Knowledge Exchange Instrument***

The following will form the basis of a discussion at the end of the second observation day with the research participant to develop a knowledge exchange instrument. The instrument will be implemented over an agreed period of time between the second and third interventions. The purpose of these questions is to involve the research participant in the overall design of the instrument. The researcher will then finalise the instrument after the meeting and give the research participant instructions on how to implement the instrument over an agreed period of time. A review of how the instrument was implemented will be the main focus of the reflective journal and the third intervention interview.

#### **Question 1: Knowledge Exchange Activity**

Let's review some of the tools and techniques I observed you used to exchange knowledge today (15 minutes).

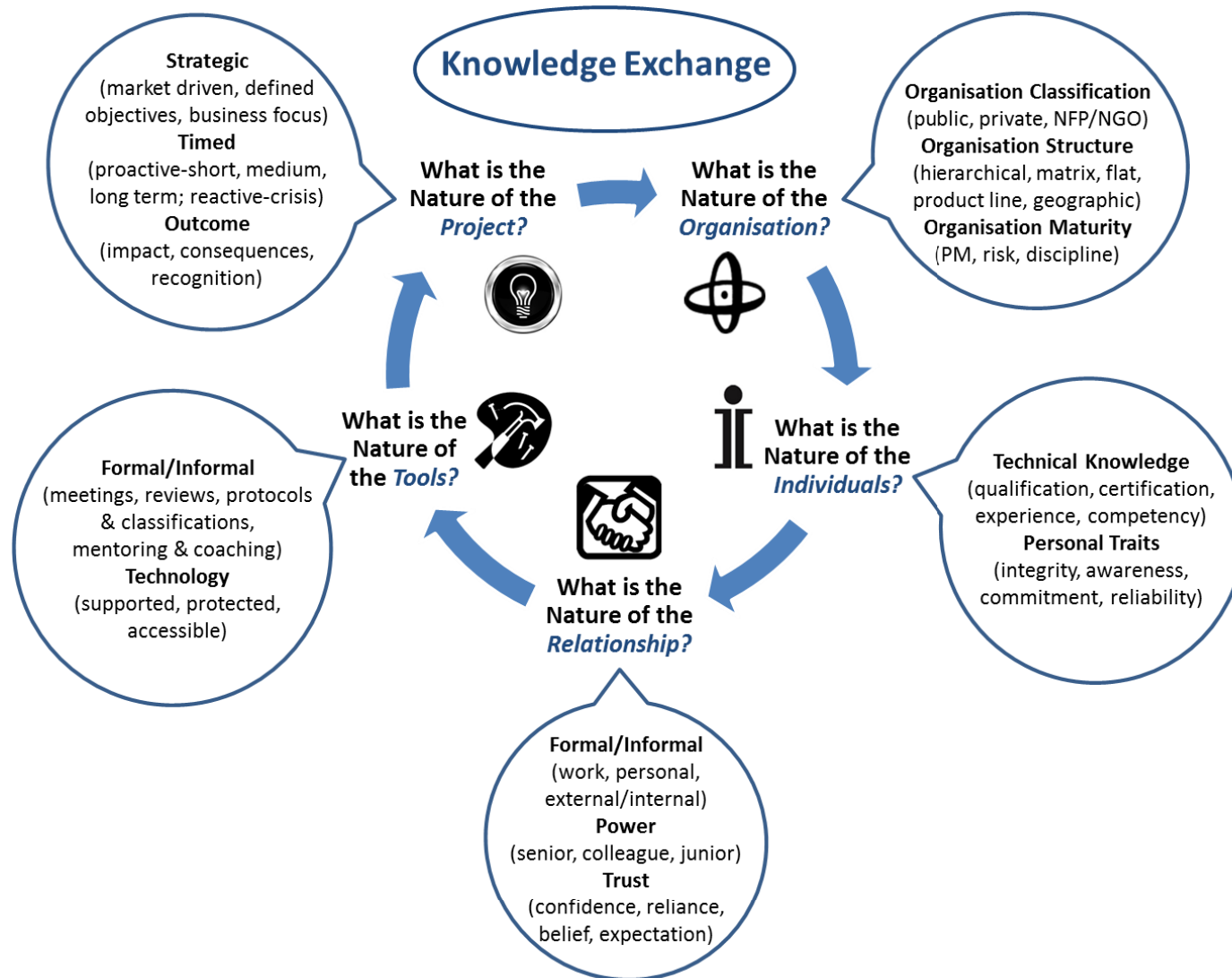
#### **Question 2: Knowledge Exchange Reflection**

Now let's have a look at what we talked about when we had our first interview and what you said you did to share knowledge (10 minutes).

#### **Question 3: Develop Knowledge Exchange Instrument**

Given we have identified some overlaps and differences, let's now talk about what the ideal knowledge exchange instrument would be for you to share knowledge while working on your projects (35 minutes).

**Return to the Observation Protocol instructions to close the interview.**



# Trigger Questions for the KEI

When you go into each knowledge exchange situation, ask yourself the following questions to focus on how you will adjust your behaviour to achieve what is desired.



**Organisation:** what is the industry sector, the nature of the business, and level of maturity you are working with as this will overtly or covertly influence how you exchange knowledge.



**Individuals:** are the people involved experienced and hold the required qualifications/certifications, and will their personal traits support or hinder how you exchange knowledge?



**Relationship:** have you planned if knowledge will be exchanged formally or informally, how will you balance the power levels, and if trust is important, how will that be established and maintained?



**Tools:** do your tools to exchange knowledge need to be formal or informal, what procedures need to be followed or developed and what are your technological needs?



**Project:** is the project strategic to the organisation, driven by time factors and what will the impact be of the expected outcomes?

## Appendix 3–RJ

### *Intervention 3–Reflective Journal Instructions*

The following questions need to be addressed regularly to ensure your reflective journal captures how you are exchanging knowledge on your project/s. Ideally you will keep a record of your experiences in the workplace as evidence of exchanging knowledge.

After you have completed five full pages, it is important to the research you review your reflections as a way of analysing your overall experiences to demonstrate a larger understanding of how you have exchanged knowledge. In this analysis we would like you to include commentary on any common threads, themes or recurring thoughts and actions.

Asking yourself ‘Why’ up to five times after each journal entry will elicit underlying patterns and reasoning.

### *Journal Entry Questions*

**1. When did I refer to the knowledge exchange instrument?**



Reflect on the reasons why I did or did not **refer** to the knowledge exchange instrument. What did I find most challenging and why?

**2. When did I use the knowledge exchange instrument?**



Reflect on how I **used** the knowledge exchange instrument. Did I use the instrument in its original state or did I modify it?

**3. How did I modify the knowledge exchange instrument?**



Reflect on how I **changed** the knowledge exchange instrument to suit my projects – note specific changes and why.

**4. What is the impact of using the knowledge exchange instrument?**



Reflect on the implications for me, my team/s and my organisation of using the knowledge exchange instrument. Did it help me in any way? Will I continue to use the original knowledge exchange instrument or the new version I created?

### *Review–What Have I Learned?*

After completing five sets of the four questions in your reflective journal, reflect on what you have already written since your last Review and identify any common threads, themes or recurring thoughts and actions.

Reflect on the most important insights or learnings from a **personal** and **organisational** perspective.

### *Contacts*

If I have any questions I can contact either the Researcher, Chivonne Algeo on +61(0) 2 9514 8727 or +61(0) 401 993 198 or her Research Supervisor, Dr. Shankar Sankaran on +61(0) 9514 8882 or +61(0) 406 137 325.



## Appendix 4–FG

### ***Intervention 4–Focus Group Meeting***

The following questions will be asked of the research participants during a two hour face-to-face focus group meeting at the University of Technology, Sydney (UTS). Preparation for the focus group meeting will involve providing a copy of the agenda, reminding the research participants of the confidentiality of their answers, the discussion will be recorded, and they can leave the meeting at any time if they feel uncomfortable.

#### **Clarification Discussion**

<b>Time</b>	<b>Topic</b>	<b>Leader</b>
3.00–3.10pm	Introduce research participants (Name, Title, Company)	Chivonne
3.10–3.30pm	<b>What was <i>positive</i> about the knowledge exchange instrument?</b>  Reflect on the reasons why I thought the knowledge exchange instrument had a <i>positive</i> impact on my work.	Facilitator
3.30–3.50pm	<b>What was <i>negative</i> about the knowledge exchange instrument?</b>  Reflect on the reasons why I thought the knowledge exchange instrument had a <i>negative</i> impact on my work.	Facilitator
3.50–4.10pm	<b>What was <i>unusual</i> or different about the knowledge exchange instrument?</b>  Reflect on what was unusual or different about the knowledge exchange instrument and how this had an impact on my work.	Facilitator
4.10–4.30pm	<b>Did anybody actually <i>change</i> the knowledge exchange instrument?</b>  Reflect on the reasons why I <i>changed</i> the knowledge exchange instrument and what impact this had on my work.	Facilitator
4.30–4.50pm	<b>Did the knowledge exchange instrument change anybody's <i>behaviour</i>?</b>  Reflect on whether the knowledge exchange instrument changed anybody's <i>behaviour</i> and what impact this had on my work.	Facilitator
4.50–5.00pm	<b>Close Focus Group Meeting</b>  To close the focus group meeting the researcher will summarise the key points from the discussion and remind the research participants about the confidentiality of the information.	Chivonne

#### **Reflective Journal**

The research participants will be asked to bring their complete reflective journals for reference in the meeting and to leave them the end of the meeting for analysis.



## Chapter 4: Data Collection and Analysis

*'The ultimate authority must always rest with the individual's own reason and critical analysis.'*

Dalai Lama, High Lama, School of Tibetan Buddhism (1935- )

### 4.1 Introduction

The focus of this study is to address the research questions of how project managers *acquire* and *exchange* knowledge, and what the project management *environment* and *drivers* mean to knowledge exchange. After examining the existing situation in Cycle 1, it became clear the data being collected was focused on how project managers *exchange* knowledge. This resulted in the need to separate the analysis of the data into two parts to address the research questions. Part 1 of the analysis focuses on the acquisition of knowledge and Part 2 of the analysis focuses on how knowledge is exchanged. The alignment of the three action research cycles with the four interventions within these two areas of focus are depicted in the following Figure 17 highlighting the delineation of the data collection and analysis.

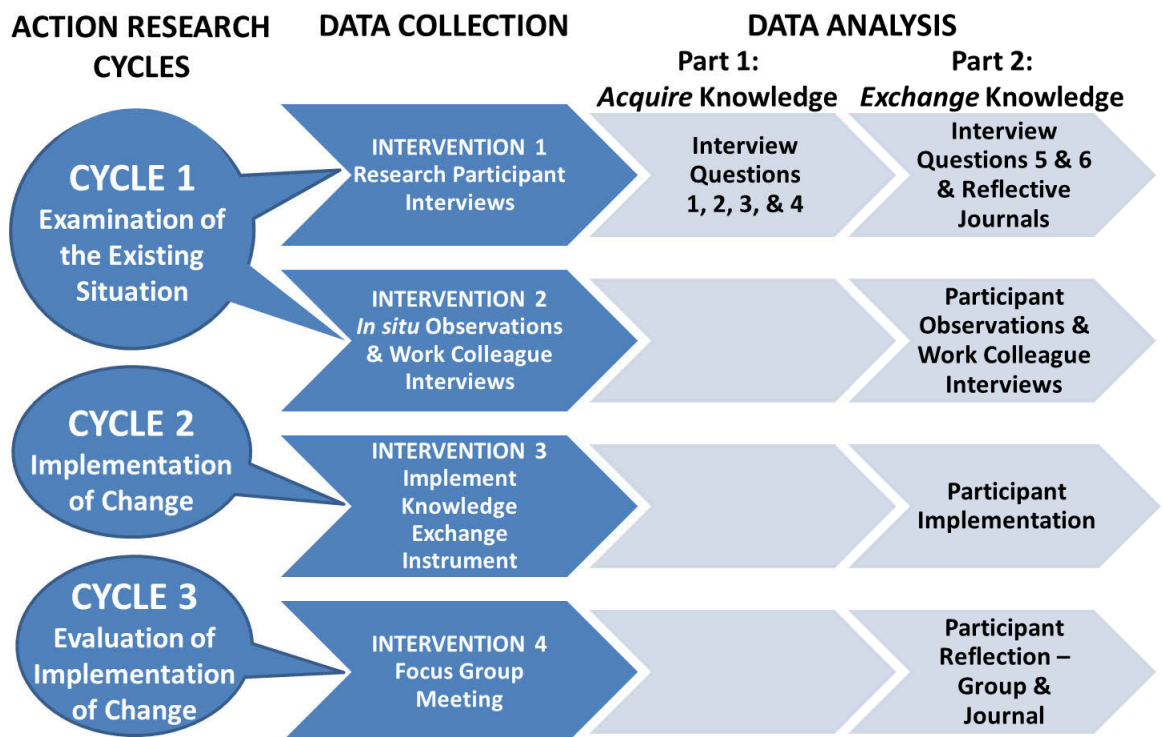


Figure 17: Delineation of data collection and analysis

The observations made from the first intervention indicate the data formed into two discrete areas, representing how the research participants actually acquired knowledge and then how they exchanged knowledge. The subsequent interventions produced data for discrete grouping into these two parts.

In 'Part 1: Acquiring Knowledge' the information given by the research participants yields insights into how they became a project manager, the significance formal project management training and education had on their development as a project manager, and how they gained their project management experience. The early findings indicate the research participants evolved into the role of a project manager primarily through practical experience managing projects, with a small number of the research participants gaining experience through formal education or other managerial roles. The importance of practical experience was supported by the data which indicates over half of the research participants integrated their formal project management training with work experience. There was an interesting extension to these outcomes with most of the research participants indicating they gained their project management experience through informal, accidental or tacit means, not through formally recognised means. This suggests people may '... fall into the role of project manager, rather than formally plan or consciously choose the career (Darrell, Baccharini & Love 2010, p. 56)' due to the '... ad hoc manner in which most project managers acquire their skills' (Pinto & Kharbanda 1995, p. 41).

In 'Part 2: Exchange Knowledge' the data was collected through interviews conducted in intervention one and *in situ* observations in intervention two. The data collected on how the research participants exchanged knowledge on their projects and across their organisations was heavily weighted toward both the 'Impersonal and Formal', and 'Impersonal and Informal' approaches. The significance of interpersonal relationships and the organisational climate in exchanging knowledge was almost equally divided between managing relationships and tasks when managing projects. The data also indicated almost all of the research participants said they gained little or no value from project management associations in providing personal development opportunities through forums to exchange knowledge.

The dichotomy appears to be the research participants *acquire* their knowledge informally through work experiences, not through training and education. These project managers apparently manage their projects in a variety of ways using both 'Informal' and 'Formal' approaches. Commonly, these project managers tend to communicate in 'Formal' ways with others, in the course of managing their respective project activities.

## **4.2 Research Questions**

The initial questions for the research focused on how project managers acquire and exchange project management knowledge and what knowledge sources project managers used to acquire and exchange knowledge. After reframing these research questions, and as a result of the literature review, the research interventions focused on how project managers acquired and exchanged knowledge, how this was supported in the project environment, and what drove knowledge acquisition and exchange. As a result of this deeper focus, I was able to examine how knowledge is tacitly and explicitly acquired; how knowledge exchange occurs; the impact of the physical and virtual environment on knowledge acquisition and exchange; and how personality, motivation and behaviour may drive the acquisition and exchange of knowledge. I also investigated the learning approaches used, and the impact of skill and competency, on acquiring and exchanging knowledge. The emergence of this refined research focus is depicted in Figure 7, in 'Chapter 3: Research Methodology and Methods, Section 3.4 Research Framework'.

## **4.3 Research Participants**

The research participants were selected based on their project management experience and willingness to participate in the research. Two project managers who participated in the interviews in intervention one, due to changes in their workplace they were unable to continue to be involved in the research, and have therefore not been included in these descriptions or any data analysed. The names of the research participants have been translated to a name from the North Atlantic Treaty Organization (NATO) phonetic alphabet to ensure their confidentiality. The study included multiple male and female research participants, and to ensure their confidentiality I used male gender references throughout the sections. The following descriptions give the background, organisation, and contact I had with each research participant, who were renamed: Bravo; Delta; Lima; Mike; Sierra; and Whiskey. A summary chart of the research participants with this information is in Table 16 below.

Table 16: Research participant criteria descriptions

Research Participant	Aust. Born	Industry	PM Experience	Bachelor Degree	Graduate Degree	PM Cert.
Bravo	Y	Infrastructure Consulting	20+	Y	N	CPPD (AIPM)
Delta	Y	Utility	10+	Y	Y	-
Lima	N	IT Financial Services	15+	Y	N	-
Mike	N	PM Consulting	20+	Y	N	PMP (PMI)
Sierra	Y	IT Financial Services	5+	Y	N	PMP (PMI)
Whiskey	Y	Government Services	20+	Y	Y	-

**Research Participant: Bravo**

Background: Bravo is Australian born with over 20 years project management experience. Bravo holds a Bachelor of Civil Engineering, and is certified with the Australian Institute of Project Management (AIPM) at the ‘Certified Practising Project Director’ (CPPD) level. Bravo was on the AIPM New South Wales (NSW) Chapter Council for five years as a volunteer Councillor.

Organisation: Bravo is a Principal with an Australian headquartered project management organisation supplying consulting services in strategic capability, engineering, and project delivery. The organisation operates in three regions: Asia Pacific, the Americas and EMEA (Europe, Middle East & Africa), deploying approximately 6,500 people from more than 40 offices to work on projects in the buildings and infrastructure, mining and metals, power, energy and water, and environment sectors.

Contact: I made my initial contact about the research with Bravo at the AIPM New South Wales state Chapter Project Management Achievement Awards. Bravo was keen to be part of the research as we had met at various industry events over the previous decade.

**Research Participant: Delta**

Background: Delta is Australian born with over 10 years project management experience, and holds a Bachelor of Civil Engineering and a Master of Legal Studies. Delta does not hold any project management industry certifications.

Organisation: Delta is the Acting Program Manager within a division of a government utility. The organisation supplies services to Sydney and surrounding areas in the state of New South Wales (NSW). The organisation is a statutory State owned organisation, wholly owned by the Government and has the remit to protect public health, protect the environment, and be a successful business.

Contact: I was introduced to Delta by a close work colleague, who I have worked with voluntarily through the AIPM. I did not have any contact details for Delta so I sent an email using what I thought would be the correct address and called via the main switch board. Delta confirmed interest, although Delta appeared reluctant at first. We made the appointment, and as it happened, my original contact had returned to work and facilitated the personal introduction to Delta.

**Research Participant: Lima**

Background: Lima was born outside Australia and has been managing IT projects for over 15 years within Australia. Lima holds a Bachelor of Science degree, but does not have an industry certification.

Organisation: Lima is a Project Manager in a holding company of a group with a diverse range of market service activities linked by a common commitment to create a globally competitive capital market. The organisation was created by a merger in July 2006 and functions as a market operator, clearing house and payments system facilitator. It also oversees compliance with its operating rules, promotes standards of corporate governance among Australia's listed companies and helps to educate retail investors.

Contact: I met Lima through an academic work colleague who agreed to help me with my research by introducing me to several project managers at the organisation to possibly participate in the research. I received the signed letter of consent from five people and asked my contact to suggest two people as I had reached the required number of participants for the study.

### **Research Participant: Mike**

Background: Mike was born outside Australia. Mike currently lives in the national capital, Canberra, has lived in Australia for over a decade, has over 20 years project management experience, holds a Bachelor of Science, Operations Research degree, and a 'Project Management Professional (PMP) industry certification from the Project Management Institute (PMI). Mike gives industry talks for the PMI and presents at various industry conferences.

Organisation: Mike is the owner of a project management training, consulting and coaching firm based in Canberra. Mike has several staff who work for Mike's organisation across Australia and in the US with a range of clients from large to small public and private sector organisations.

Contact: I made my initial contact about the research with Mike at a project management conference and Mike was keen to be involved in the research. Mike's interest was also sparked by an academic work colleague, known to both of us, who encouraged Mike to participate in the research.

### **Research Participant: Sierra**

Background: Sierra is Australian born, originally from Perth, relocated to Sydney due to her (or his) spouse's posting, and then returned to Perth during the research. Sierra has five years experience managing projects, holds a Bachelor of Business degree, and has a PMP certification with the PMI.

Organisation: Sierra works for the same organisation as Lima and is a manager for quality assurance and testing.

Contact: I met Sierra through the same academic work colleague who kindly agreed to help me with my research and introduced me to project managers at the organisation who would participate in my research Lima and Sierra.

### **Research Participant: Whiskey**

Background: Whiskey is Australian born with over 20 years experience managing projects. Whiskey holds a Bachelor of Civil Engineering and Masters of Environmental Planning, but does not hold any project management industry certifications. Whiskey has been on the AIPM NSW Chapter Council for over 15 years as a volunteer Councillor and presents at AIPM conferences.



Organisation: Whiskey is the General Manager for a strategic business unit in a Government Office providing expert advice to enable government agency clients to deliver their services to the community. Their expertise and experience in planning, design, delivery and maintenance of building and engineering projects enables them to help clients maximise value, minimise costs and manage risks in infrastructure programs and in the management of assets.

Contact: I made my initial contact about the research with Whiskey at the AIPM NSW Chapter's Project Management Achievement Awards, where he indicated a keenness to be part of the research.

### **Summary of Research Participants**

The research participants were selected according to a set of predetermined criteria to ensure they were appropriately experienced to be included in the research. Examining the backgrounds of the six research participants showed their demographics varied in gender, age, place of birth, and experience, and represented a cross-section of industry including private and public sector organisations. This variety was to ensure diversity in the group. Specifically, their age was not a selection criterion, as the focus was on experience i.e. the number of years managing projects, and the cross section of industry sectors. The two research participant's indicated they were within a few of years of retiring, two with approximately ten years to retirement, and two who might be described as in the middle of their career. Again, this range was to create a diverse group. All research participants expressed they were keen to contribute to their work roles and continue to develop their teams, organisations and themselves.

### ***4.4 Chronology of Contact***

The contact made with the research participants over the four action research cycles spanned 18 months and followed an agreed schedule of interventions which at times was altered to accommodate the availability of the research participants. The schedule also included the spin-off cycles where I engaged with the external reference group. The initial plan to interact with the research participants included three interventions and two meetings with the external reference group. Following the first interactions with both groups I redesigned the contact schedule as I needed more interactions with these two groups. This need for more interaction stemmed from my reflections on the discussions I had with the research participants where it became evident they required an individual meeting to be briefed on the implementation of the knowledge exchange instrument and how to complete the second reflective journal. The

following is one of my reflections from a meeting with the external reference group after intervention one ‘... may need to engage further with the external reference group to review development and implementation of a knowledge exchange tool’.

The initial contact plan is depicted below in Figure 18 followed by the more detailed actual contact plan in Figure 19. The progression of the interactions also saw the role of the research participant evolve from an *informant* to a *partner* in the research process.

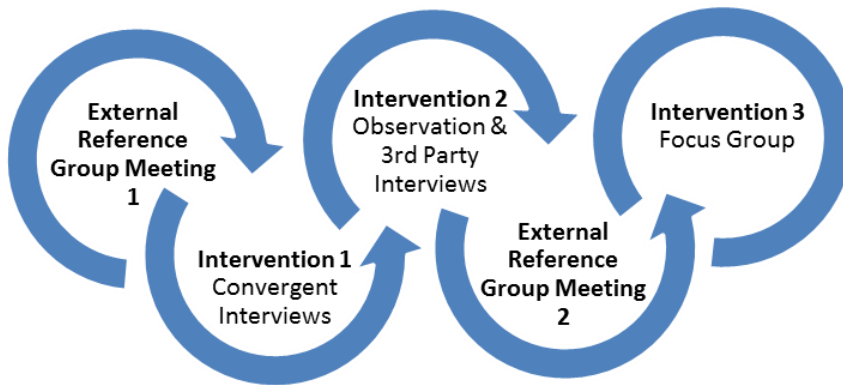


Figure 18: Research participant initial contact plan

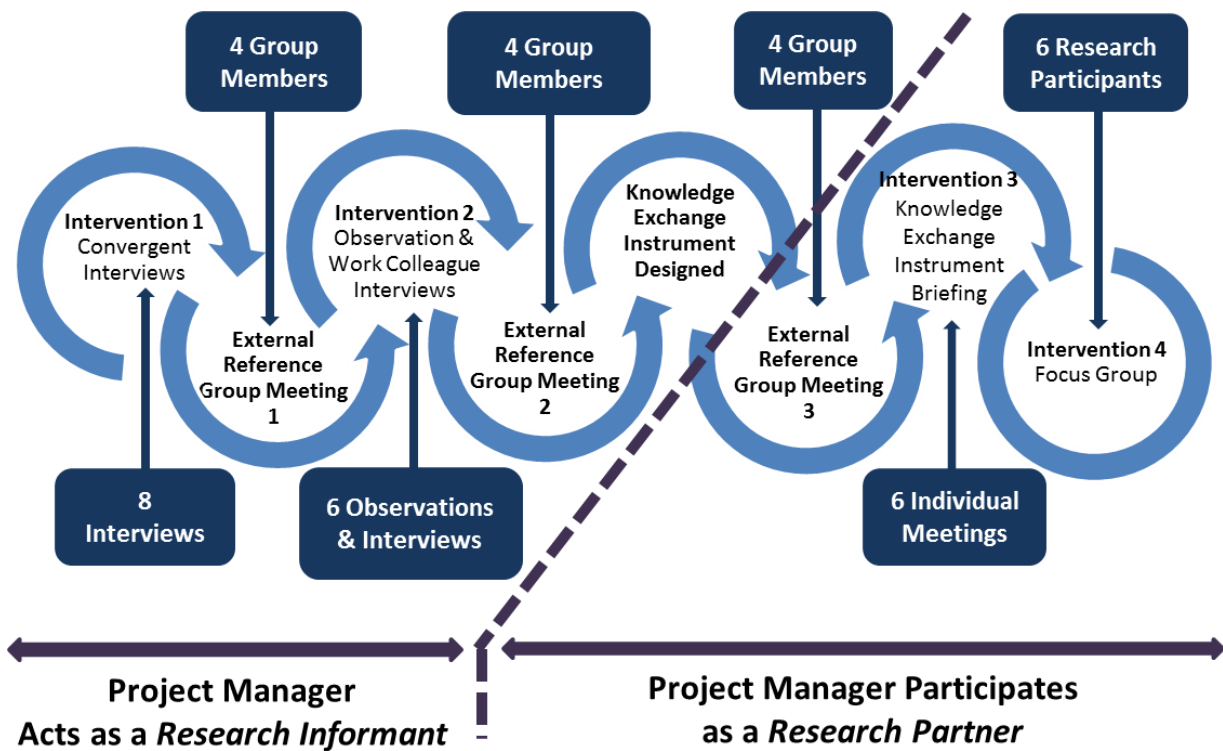


Figure 19: Research participant evolved contact plan

## 4.5 *Data Collection and Transcription*

The four action research cycles were developed to collect data from the research participant, a work colleague of the research participant, and myself, the researcher. These three perspectives are the lens through which data was analysed and is described in more detail in 'Section 4.6 Data Analysis'. As outlined in 'Chapter 3: Research Methodology and Methods', the research participants were interviewed for an hour in their workplace for the first intervention, followed by the second intervention when I observed them in their workplace, or *in situ*, for an entire workday. During this observation day I also interviewed a work colleague whom research participant selected, to identify what other team members observed about how the research participant exchanged knowledge. The third intervention involved a briefing with each research participant on the implementation of a knowledge exchange instrument. All but one of the research participants came to my workplace—the University, for the fourth intervention to participate in a focus group to discuss how they had implemented the knowledge exchange instrument. A separate discussion took place with the research participant who was unable to attend the focus group, with this data included for analysis. The first and second individual reflective journals were collected from the research participants at the conclusion of the focus group meeting.

The data was collected according to:

- What the research participant *said* they did to exchange knowledge, as recorded through interviews conducted in intervention one.
- What the research participant actually *did* to exchange knowledge, observed *in situ* in intervention two.
- What the work colleagues *said* the research participant did to exchange knowledge, as recorded through interviews conducted in intervention two.
- How the research participant *reflected* on how they exchanged knowledge during and after a change was introduced, in the form of a knowledge exchange instrument, and what the outcome or *result* was from this change.

The collection of the data through these different perspectives, and throughout the four interventions, is depicted below in Figure 20.

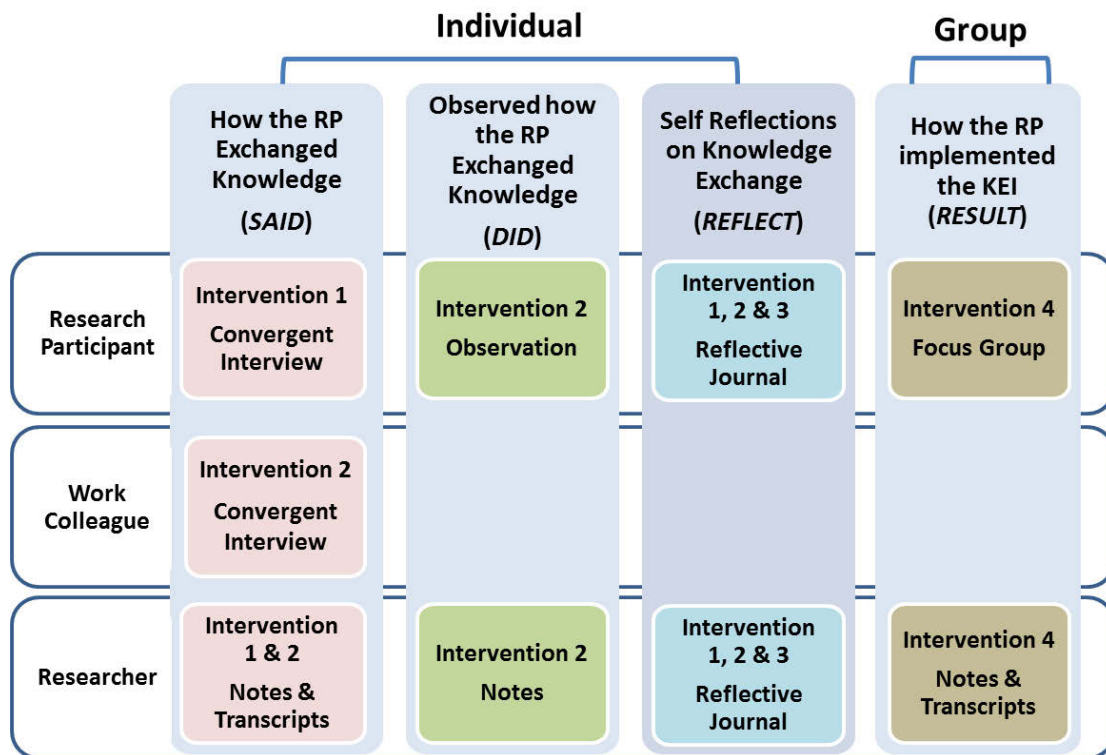


Figure 20: Individual and group data analysis perspectives—research participant, work colleague and researcher

The data I collected was transcribed in two ways depending on the medium used to collect it. The audio responses from the interviews with the research participants and the focus group meeting were digitally recorded. I initially transcribed the first interview, and then I engaged an external company to transcribe the remaining interviews and the focus group meeting as it saved considerable time. The interviews with the work colleagues, and the *in situ* observations were recorded through my handwritten notes. These notes were transcribed after each intervention by typing both my notes and my reflections into a standard template. I also took handwritten notes during the interviews with the research participants and during the focus group meeting, which I also transcribed by typing into a standard template to add to the transcriptions from the digital recordings. All transcriptions were given a reference code to identify if they were from a handwritten note or from a digital recording. In addition, the focus group meeting was videoed as a back to mitigate the potential risk of losing data.

The collection and transcription of the data followed the approach described in ‘Chapter 3: Research Methodology and Methods’. I have highlighted the first and second step in this approach in Figure 21 below.

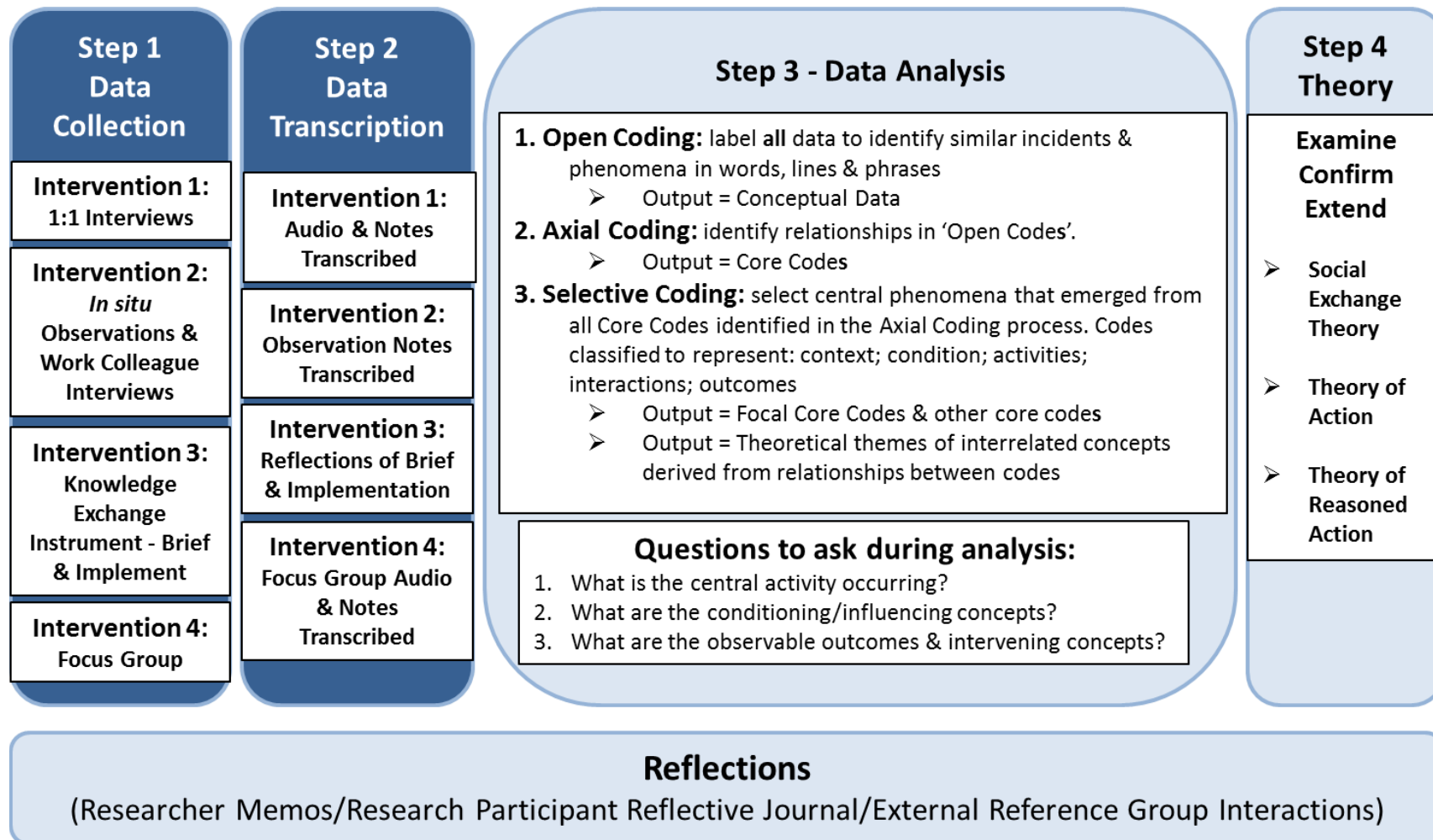


Figure 21: Data collection and transcription approach—steps 1 and 2

The data collected in the interventions is described below with an account of the intervention followed by the context of the interaction and my reflections of the interaction with each research participant.

#### **4.5.1 Action Research Cycle 1: Examination of the Existing Situation**

##### **Intervention One—Interviews**

To obtain the necessary information from each research participant to answer the research questions, I structured the interview into three stages. The first stage of the interview involved obtaining the background of each research participant. This information included their name, title, company and any qualifications and/or certifications they held. The second stage of the interview started with an open question where I asked them to tell me something about how they became a project manager. I followed this question, which was given at least 50 per cent of the interview time, with five focused questions addressing the key areas I was interested in investigating based on the literature review. The questions I used as the framework in each interview are listed below:

1. *Education*—what significance did formal project management training have on your development as a project manager?
2. *Experience*—how do you gain your project management experience?
3. *Memberships*—what is the value of project management associations in your professional development?
4. *Knowledge*—can you tell me something more about how you exchange knowledge on your projects and across the organisation?
5. *Behaviour*—what is the significance of interpersonal relationships and the organisational climate in exchanging knowledge?

The third stage of the interview involved handing over a purpose designed reflective journal for the research participant to capture how they exchange knowledge. The context of the interviews and my reflections of the interactions with each research participant are described in the following section.

## **Research Participant: Bravo**

### Context:

The interview was held in Bravo's office, even though Bravo had booked a meeting room. Bravo thought this would give me an insight into his work environment. The meeting went very quickly with Bravo providing rapid and direct responses. Bravo was comfortable with the process which I outlined at the beginning of the meeting. I reminded Bravo the information we exchanged was confidential and Bravo said there had not been enough time to print or sign the letter of consent but would do so straight away and email me a scanned copy.

Bravo had to take one call during the meeting and also meet with a consultant, so the interview was stopped twice. During the first interruption Bravo gave me a Lessons Learnt PowerPoint presentation to read as one of the tools used to share knowledge. The information was captured under various headings such as 'client', 'contract', and was honest and constructively critical of the lessons learnt on the project. Bravo suggested a useful addition to the second intervention—to spend some time, maybe half an hour, with a peer to discuss how Bravo shared his knowledge.

### Researcher Reflections:

During the interview Bravo was busy and distracted at times, although Bravo was very focused on answering the questions with detailed and rapid responses. Bravo's office was chaotic although Bravo could find documents when required. Bravo gave answers to direct questions and elaborated on points when I asked Bravo to expand on certain comments. Bravo was keen to show me emails and other artefacts demonstrating how work was managed. Bravo did not think he exchanged knowledge and considered working on project activity to be the most important priority.

## **Research Participant: Delta**

### Context:

The interview was held in a meeting room near Delta's office and, as I had no previous contact with Delta, I took time at the beginning of the interview to outline how the introduction had been made through a mutual work colleague. I wanted to build rapport with Delta and spoke about the experiences I had had as a project manager and an academic, and the challenges leading me to explore gaps in knowledge through my PhD research. Delta was very organised

and had the signed letter of consent for my files, and stated it was understood all information discussed was strictly confidential.

#### Researcher Reflections:

During the interview Delta was focused, although sometimes distracted by people walking past the glass walled meeting room. Delta seemed interested in what I was researching, although at times did not appear to want to spend too much time talking beyond what was thought to be an appropriate answer to the question. Delta was able to give very clear answers and was keen to learn about how, through participation in this research, Delta would be able to learn more and add to personal skill base.

#### **Research Participant: Lima**

##### Context:

The interview was held in a separate meeting room on a floor of meeting rooms where we began talking about my background as we had been introduced by a colleague and had not previously met. I offered this personal context to build a relationship and level of trust with Lima to encourage trust and openness during the interview. I reminded Lima the information gathered during the research was strictly confidential as I described the background to the research, reminding Lima I needed the letter of consent signed which was done at the end of the interview.

##### Researcher Reflections:

When Lima met me he was keen to start the interview and he was very open about career and personal history. Lima was a little reluctant at first but as we started to talk about my background and then moved into the interview questions he started to talk more openly about how they had become a project manager.

#### **Research Participant: Mike**

##### Context:

The interview with Mike was held in a hotel restaurant over lunch which proved to be noisy and distracting. This was unavoidable as it was the only time Mike could meet me between meetings. I asked Mike some general questions about how he became a project manager and led into the types of training he underwent specifically for developing his project management



skills. We then discussed how he shared knowledge when working on a project and how he had developed techniques over time they believed worked. I reminded Mike the information we exchanged was confidential and the letter of consent was signed.

#### Researcher Reflections:

During the interview Mike was very animated (passionate) and keen to talk about personal knowledge. The questions were answered throughout the interview although not strictly in the order asked. I did not direct Mike to answer the questions in order as at times he became very excited to share histories. Mike was also openly reflecting on the background to the questions as he said these questions had not been asked in the past. Mike told stories from his career in a chronological order, moving from his early years which formed the foundation of his experience, into more demanding and exciting roles at an early age, then to the present day where he talked about how much giving back his knowledge was enjoyed. Mike also described how interactions with his physical environment to gather and explore knowledge, from sitting at a desk, standing at another desk, working in different offices occurred. Mike also described how he used different mediums to share knowledge wherever possible, for example with a white board, a computer, or using coloured paper.

#### **Research Participant: Sierra**

##### Context:

The interview was held in the same formal office environment as Lima, as he work for the same organisation, although in different areas and on different projects. Sierra started with an introduction and started to talk about his work and reminded me another meeting was scheduled straight after our interview. To build rapport, as I had been introduced to Sierra by a work colleague, I shared a personal story about managing demanding personal responsibilities and work as I had heard him talking about a family issues coming into the meeting room.

##### Researcher Reflections:

Sierra was very business-like and wanted to start the interview and not spend too much time going through the background of the research. I presented an outline of the interview process and gave Sierra a very brief overview of the research before starting the interview. Sierra did not seem interested in the background to the research, but was keen to talk about his demanding role in the organisation requiring work on weekends, which was difficult when also

managing personal demands. Sierra seemed very pressured about time and was not very comfortable spending time answering questions in the interview.

### **Research Participant: Whiskey**

#### Context:

The interview was held in a meeting room in Whiskey's office where we immediately started the interview. The meeting was very methodical and I was cautious about how much I said as I had received the transcripts from the first two interviews which had quite a number of my comments. Whiskey was very quiet and took some time to feel somewhat at ease with discussing how he became a project manager and how they shared extensive knowledge. I reminded Whiskey the information gathered was confidential and this seemed to make him a little more comfortable.

#### Researcher Reflections:

During the interview Whiskey was very relaxed and happy to share information when talking about the areas where he was most comfortable, such as current projects and the focus of the group managed. This took some time as Whiskey appeared to be uneasy with the questions about his background and how they shared knowledge. To ensure I received answers to all the questions, I reorganised them to work around what Whiskey was interested in talking about and then linked Whiskey's comments into the questions.

### **Summary of Intervention One—Interviews**

The first intervention was structured and focused due to the background documents I had prepared and resulted in data being collected laying the foundations for the subsequent interventions. However, I was surprised at the diversity in the behaviour of the research participants, with not one engaging in the interview in the same way. The one common theme was once I gained a level of trust the interviews all went over the scheduled time planned, with the research participants eagerly wanting to share their experiences. However, the time it took to gain this level of trust and the approaches I adopted varied greatly. The differences in establishing a comfortable environment for each interview appeared to be based on prior knowledge, common experiences, both professional and personal I shared with each research participant, and the physical space they chose for the interview. These observations of how to engage each research participant, each in different ways, were incorporated into planning

future interventions, which allowed for a deeper level of access when gathering data. An example was when I had interviewed Mike in a bistro which I had anticipated would be conducive to an informal discussion. This was not the case due to the noise and lack of privacy, so for all future interviews with the research participants I asked them to identify a quiet space to meet.

## **Intervention Two—*In Situ* Observations**

The observation days all started with a discussion with the research participant to confirm the process of observing their work, a time at the end of the day to discuss the development and use of a knowledge exchange instrument, and to confirm the time I would be conducting an interview with one of their work colleagues. I also discussed with the research participant the context of the meetings which were booked during the observation day, and if they had any questions about the process. In particular I reinforced I would not be interacting with anyone other than themselves, and their chosen Work Colleague for the interview, during the observation day. The research participants were also given a second set of pages for their reflective journals to complete when they were implementing the knowledge exchange instrument.

To begin a discussion on the development and use of the knowledge exchange instrument, the research participants were given a broad definition of knowledge exchange. The definition I developed for them was that knowledge exchange is a deliberate interaction between decision makers and other individuals or groups of people who are working together to achieve an outcome and is more than a one way or linear communication of information. This definition was based on the work conducted by McKay and Marshall (2001) where they found ‘... real-life thinking and acting will rarely follow the neat linear sequence implied by ... preceding diagrams and descriptions’ (McKay & Marshall 2001, p. 52).

The discussion at the end of the observation day focused on what the research participants wanted and what they would not find beneficial from the use of a tool to assist them to exchange knowledge. The discussion also revisited what each of the research participants had said in the first intervention in regard to how they exchanged knowledge. The aim of involving the research participant in the specifying the requirements for the knowledge exchange instrument were to ensure maximum uptake of this purpose designed Instrument. I also hoped by incorporating these requirements it would elicit a change in the conscious way they exchanged knowledge.

The observation day concluded with a summary discussion on the outcomes of the observation, the development of the knowledge exchange instrument, their progress on completing the first reflective journal, and assuring the research participant all the data collected was strictly confidential. The context of the *in situ* observation days and my reflections of the interactions with each research participant are described in the following section.

### **Research Participant: Bravo**

#### Context:

Bravo referred to team members in a positive manner and would ask questions in a direct way to ensure the appropriate emphasis. Based in Bravo's years of experience, he gave insights on how to manage during what appeared to be a slow work period. Attention was often on immediate issues and Bravo often rushed from one interaction to another, although he offered time to less experienced project managers for informal mentoring. Lack of documentation led Bravo into challenging discussions at times, in particular regarding contracts where Bravo had long standing relationships with the client and had assumed they would honour informal agreements. Conversely, Bravo was also direct with team members and would oversee detailed work, even dictating content of documents.

#### Researcher Reflections:

Bravo has many decades of experience and often approached exchanges just-in-time with little preplanning in a format to share with others. This was evident when team members shared information in an email Bravo had not read. Bravo was considerate of individual experience and circumstances, especially if relocation was being proposed. Due to Bravo's experience, the relationship with senior managers was congenial and Bravo often seemed to have more knowledge, which was used positively in most cases, although at times it led to a debate when making a decision. Bravo was at times dismissive of team members, yet the exchanges were delivered in such a positive manner he was seen as endearing and constructive.

### **Research Participant: Delta**

#### Context:

I met with Delta in the office where we had an informal discussion before moving into a formal meeting with a senior manager. Delta was always prepared with an answer based on a

thorough knowledge of the projects, and detailed documentation. Delta was conservatively animated when exchanging knowledge, making gestures or using the whiteboard to ensure a message was relayed appropriately. Delta's focus was on the detail of the projects and managing risks, due to the public infrastructure and safety requirements of the work. Delta mentioned the organisation was attempting to formalise an approach to extract the knowledge from retiring 'older guys' who had a vast amount of work experience.

#### Researcher Reflections:

Delta approached almost every exchange in a formal manner, using reports and other tools to explain project details, and at the same time using what Delta called a 'gut feel' to ensure all the work was being managed effectively. Team members and senior managers exhibited similar behaviours, which appeared to be working within a highly constrained environment where multiple procedures are required to be followed to manage projects. Delta was respectful and supportive of senior managers, providing what was needed, with honest responses even if Delta did not have an immediate answer.

#### **Research Participant: Lima**

##### Context:

Lima conducted exchanges with his team in a collegiate manner, agreeing what action needed to be taken to address the issues raised, and commending some of the constructive ideas raised. To ensure all understood what was agreed in the meetings, Lima used a whiteboard to write up the outcomes and revisited these points naming those responsible for the actions. Lima also controlled meetings to ensure those attending were able to contribute, as some people were consistently speaking over others. Lima was also mentoring a team of graduates who were very well prepared for a presentation on a detailed and complex project.

##### Researcher Reflections:

Lima delegated responsibility for delivering project outcomes by encouraging team members to select what they wanted work on. Lima asked questions when necessary, and took the discussion to a private area when appropriate to explore a more detailed brief for those needing additional information. Lima focused on the scope of projects and how tasks could be delegated to team members to encourage learning opportunities. As a contractor, Lima is very aware of staff issues and covert agendas when delegating tasks due to his previous permanent role with the organisation and 'gut feel'.

## **Research Participant: Mike**

### Context:

I travelled interstate to observe Mike in the workplace, in several locations. The locations included a café, and two client sites. Mike undertook progress reviews and was instructional, providing advice on how best to manage a project within delegated limits of authority, and avoid implementing costly processes. Mike also discussed the impact and management of various personalities involved on projects with appropriate managers and shared observations of the personal dynamics involved when exchanging knowledge, suggesting people are 'hired for their capability and fired for their personality'. Mike did not need to use formal tools when exchanging knowledge, as most interactions involved him talking, writing down information for others, or demonstrating how a tool worked. Mike gave an example of how progress of a large complex project was communicated by building with the team a large three dimensional model of the milestones along a thoroughfare in the office.

### Researcher Reflections:

Mike led many of the exchanges, assuming a role of coach or mentor to those on various projects, regardless of whether they were a client or a team member. The focus was often on how the strategic outcomes would be met, and what the benefits would be to the business. Mike would leave the tactical approach to the individual or team to work on, providing advice in the form of questions if needed and offering to help if required. Mike demonstrated the ability to understand what each person needed to know, and tailored the exchange of knowledge to suit what was needed, referring to 'listening moments' to understand what was required. Mike would then take control and manage the discussion, always closing with a summary of agreements and next steps.

## **Research Participant: Sierra**

### Context:

I met Sierra in the office and started almost immediately with an informal meeting with the project team to view a presentation. The exchanges in these smaller meetings was less strained and focused on the detail of the project, as compared to the larger formal meetings where robust discussions occurred with people talking over each other, often requiring Sierra to intervene. Sierra used maps, such as data projectors, to convey detailed information in meetings where questions were raised to gather more information. Sierra was always well

prepared for meetings, whether they were informal or formal. However, in one situation when a manager did not supply an appropriate brief, Sierra appeared unprepared in front of a senior manager.

#### Researcher Reflections:

Sierra approached all interactions in a clear and focused manner, engaging when needing to instruct and disengaging when other priorities appeared, such as a phone call. Sierra created opportunities for team members to interact by giving them responsibility for agreed tasks. In exchanges with senior managers, Sierra was able to give full and detailed answers, which at times did not appear to satisfy the requests. This resulted in Sierra being instructed after the meeting on what specific words to use when preparing documentation by his manager. Conversely, I observed Sierra conduct many informal exchanges by walking around and talking with team members, and often having people come to talk with him at their desk.

#### **Research Participant: Whiskey**

#### Context:

Whiskey prepared for meetings by writing notes on a white board to organise thoughts just prior to the meeting. Exchanges often centred on Whiskey's desk and if required, moved the meeting to a more private location. Whiskey's seniority within the organisation resulted in most exchanges focusing on outcomes at a strategic level, instructing project team members to organise tactical requirements. However, at the same time Whiskey's focus included the detailed requirements to identify what skill levels were needed for various projects, and who the appropriate resources would be to fulfil requirements. Whiskey gave direct instructions to team members if they had not prepared the necessary detail expected for a discussion. Interactions with senior managers were of a collegial nature, as Whiskey had a similar level of knowledge and experience, and therefore respect.

#### Researcher Reflections:

Whiskey's approach was relaxed and confident in all exchanges due to seniority and knowledge, although at times he referred to a more senior executive for a significant decision. Whiskey was concerned many experienced managers were retiring, leaving a gap in the knowledge required to work on planned projects. When discussing sensitive information, Whiskey took meetings to a café as he was aware of the political agendas in the organisation

due to length of service. Whiskey ensured team members were supported when working on projects, in particular, with background information on the political agendas.

### **Summary of Intervention Two—*In Situ* Observations**

Throughout all the *in situ* observations, the research participants appeared to be in control of their project work, although those with less experience appeared to interact in a more subservient manner, even though they actually held the power through their specific knowledge. The majority of the research participants exhibited their control of an interaction in a more obvious, and at times in a constructively disruptive manner. These constructive disruptions were, for example, in the form of deliberately challenging questions the research participant asked the project team when ascertaining progress on a project issue. This behaviour allowed for an overt way to identify if all details were being managed, and all options investigated.

The research participants' ability to delegate tasks, at either a tactical or strategic level, appeared to be linked to level of experience and confidence in their own abilities. This was referred to by all research participants as an ability to know what was required, either through past experiences or their internalised 'gut feel' for a situation. The research participants would exhibit this tacit knowledge when they asked a question they knew they could answer, but importantly, the team member would learn from their investigations to answer the question.

I observed all research participants were able to adapt to the situation by customising their sometimes unplanned approaches used for different audiences to ensure they were able to manage the desired outcome for their projects. For example, they may have adopted a more formal approach for interactions with senior managers, or as was the case for the majority of the exchanges, an informal approach with work colleagues. These approaches differed depending on the research participant's level of experience, their status within the organisation, and their unique character.

### **Intervention Two—Work Colleague Interviews**

The interviews with the research participants' work colleagues were held either during the observation day or a short time after if the work colleague was not available. The names and gender of the work colleagues have not been included, and to ensure their confidentiality I used male gender references throughout the sections. The questions I asked the work colleague were similar to the questions asked of the research participant in the interviews in



intervention one. I ensured each work colleague was given a copy of the letter of consent and information sheet, which we both signed and I left a copy, or emailed one, to the work colleague for their records.

The interview with the work colleague was structured into two stages. The first stage was to obtain background with information such as their name, title, company and any qualifications and/or certifications they held, with a question to note their relationship to the research participant. The second stage of the interview started with an open question where I asked the work colleague to tell me how they exchanged knowledge and possibly learnt from the research participant. I followed this question, which was given at least half of the interview time, with three focused questions addressing the key areas I had reviewed in the literature, and one open question to conclude the interview. The questions are listed below:

1. *Experience*—how does the research participant share their project management experience?
2. *Knowledge*—can you tell me how the research participant exchanges knowledge on your projects and across the organisation?
3. *Behaviour*—how does the research participant manage interpersonal relationships in the organisation to exchange knowledge?
4. *Open*—have you any other information you can share with me to help me understand the way the research participant exchanges their knowledge?

The context of the interviews and my reflections of the interactions with each work colleague of each research participant are described in the following section.

### **Research Participant: Bravo's Work Colleague**

#### Context:

The interview was held in the work colleague's office and a letter of consent was signed. I recorded the interview which was reduced to half the time required as he wanted to discuss work in Asia. Bravo came to get me for the next meeting and was surprised I was still with the work colleague, who was Bravo's manager. I digitally recorded this work colleague interview, and after the meeting I reflected on the reluctance of the work colleague to be digitally recorded. I decided for future interviews with work colleagues that note taking would represent a sufficient record of the interview.

### Researcher Reflections:

Bravo's work colleague was very definite and formal in his answers, and did not elaborate on his responses, moving swiftly from one question to the next. Bravo then relaxed into the discussion when we started to talk about the work colleagues' work and time in Asia, in particular, India. Bravo's work colleague appeared to be more interested in talking about what was enjoyable during his time working and living in India rather than how Bravo exchanged knowledge. This seemed to be due to the respect the work colleague had for Bravo from working together over many decades at the same company. The work colleague answered the interview questions in a slightly dismissive way as he appeared to consider them unnecessary.

### **Research Participant: Delta's Work Colleague**

#### Context:

The interview with Delta's work colleague was held in a small meeting room near Delta's workstation. The privacy of the room created a space for the work colleague to share information about how Delta shares knowledge when managing projects. The work colleague is several levels above Delta and was very formal in the responses to the interview questions.

#### Researcher Reflections:

The work colleague was comfortable to share information about Delta's engagement during project work and was very complementary about the expertise and support given by Delta. The work colleague suggested without the knowledge and the capability Delta had shown in managing some challenging projects, he would not have achieved the desired outcomes. The work colleague was answering the questions in a guarded and formal manner and appeared to avoid saying anything that could be misinterpreted.

### **Research Participant: Lima's Work Colleague**

#### Context:

The interview with Lima's work colleague was held in a large formal meeting room at the organisation where he worked. The meeting was held early in the morning so there were no other people in the office. The work colleague signed the letter of consent which I emailed after the interview. The work colleague is in a senior position, several levels above Lima, and they gave direct responses to the interview questions.

### Researcher Reflections:

The work colleague was very focused to answer the questions as quickly as possible due to a busy work schedule. Due to the close working relationship between Lima and the work colleague, feedback was direct and honest. The work colleague also discussed how well Lima was performing and it had been recognised by senior management, particularly as he was a contractor.

### **Research Participant: Mike's Work Colleague**

#### Context:

The interview was held in the work colleague's office, after Mike introduced us and then moved away to attend to work matters. The work colleague signed the letter of consent and we spent time discussing the nature of the work Mike expected to be delivered. The relationship between the two was described by the work colleague at a peer level, although the work colleague at times suggested Mike was much more experienced. However, as Mike was a contractor he reported directly to the work colleague and therefore could be considered to be below the work colleague's level.

### Researcher Reflections:

The work colleague was very comfortable with talking about Mike's work at the organisation as he had been engaged as a contractor for over two years on a major project. There seemed to be a great deal of respect for the professional work Mike produced and his engaging manner to deliver more than what was expected. The work colleague understood the value of the research as they wanted to ensure Mike's knowledge of the project would be transferred before it finished and he potentially left the organisation.

### **Research Participant: Sierra's Work Colleague**

#### Context:

The interview with Sierra's work colleague was held in a small meeting room within sight of his workstation. The work colleague signed the letter of consent and due to work schedule the meeting was brief, although some time was taken up talking about Sierra's work colleague's desire to teach at university. The work colleague was at the same level as Sierra and they worked on interdependent projects.

### Researcher Reflections:

The work colleague was willing to share information about Sierra's ability to exchange knowledge during project work. The work colleague commented on their own depth of knowledge and intimated they had knowledge superior to Sierra's. The work colleague gave some complimentary feedback on Sierra's ability to share information. However, there appeared to be an imbalance in the way the work colleague followed a compliment with a criticism based on their perception Sierra lacked experience.

### **Research Participant: Whiskey's Work Colleague**

#### Context:

The interview was held in a casual eating area on a different level within the office and started with the work colleague signing the letter of consent. The interview was held after I had conducted the observation day with Whiskey, as the work colleague was not available on the day. This created both a physical separation from the work colleague, and time for me to reflect on the notes I had taken during the observation day and in the first intervention interview. The work colleague was several levels below Whiskey, although they had a close working relationship due to the length of time they had worked together.

#### Researcher Reflections:

The work colleague was relaxed possibly from previous conversations we had leading up to the interview. The work colleague was complimentary of the way Whiskey was managing in a challenging environment due to across-the-board reductions in spending. The work colleague assumed I knew how Whiskey exchanged knowledge and sought confirmation of what the work colleague was saying was what I had observed.

### **Summary of Intervention Two—Work Colleague Interviews**

The interviews with the research participant's work colleague seemed in some cases to be an unnecessary interruption to their schedule. They often commented they had no issues with the work their colleague was delivering, especially if they had worked with the research participant for a significant amount of time. They also assumed as I had spent time interviewing and observing the research participant I only required confirmation of the data already collected.

As I did not have any previous contact with the work colleagues, the level of interaction was formal when answering the questions with little elaboration or constructive criticism. Where the work colleague was very familiar with the research participant, the responses were more detailed and complimentary. However, if they were a peer, the work colleague tended to promote their own depth of knowledge, sometimes being critical of the research participant's lack of experience or capability.

In most interviews the work colleague engaged with me at a peer level, and saw the value of the research participant sharing their valuable knowledge, in particular if they were moving to another area.

## **4.5.2 Action Research Cycle 2: Implementation of Change**

### **Intervention Three—Knowledge Exchange Instrument Briefings**

The knowledge exchange instrument was developed as a tool for the research participants to structure how they exchanged knowledge, and is depicted in Diagram 3 below. I developed this tool from the research participants' responses during the interviews in intervention one, and from specific discussions during intervention two about what they needed to assist them in exchanging knowledge. The external reference group was given an outline of the purpose of the tool and how I was developing the content, with the focus on the appropriate use of the tool in the research not on the content. The following quote is from my reflections of the meeting with the external reference group after intervention one: '... I need to clarify my approach to the preparation of the knowledge exchange instrument so as to ensure I appropriately embed this tool within the action research approach'.

The tool was developed along two levels. The first level included five key questions for the research participants to consider when planning to exchange knowledge. These questions were based on the key areas they had indicated were important to consider when working on their projects. The second level extrapolated each question to include examples gleaned from the interview questions and observations. Once the knowledge exchange instrument had been developed I reviewed the approach and specific content areas with the external reference group prior to intervention three. From my reflections of this meeting, the feedback from the group was positive and they agreed the questions addressed what I noted in my reflective journal as '... the practicalities of exchanging knowledge rather than the assumed or intimated understanding that the exchange of knowledge will have an impact on the values, benefits, outcomes and possible drivers of the organisation'. These questions to address the strategic

impact of exchanging knowledge are outside the research topic, although this has been addressed in 'Chapter 6: Conclusions and Implications, Section 6.5—Research Limitations and Further Research '.

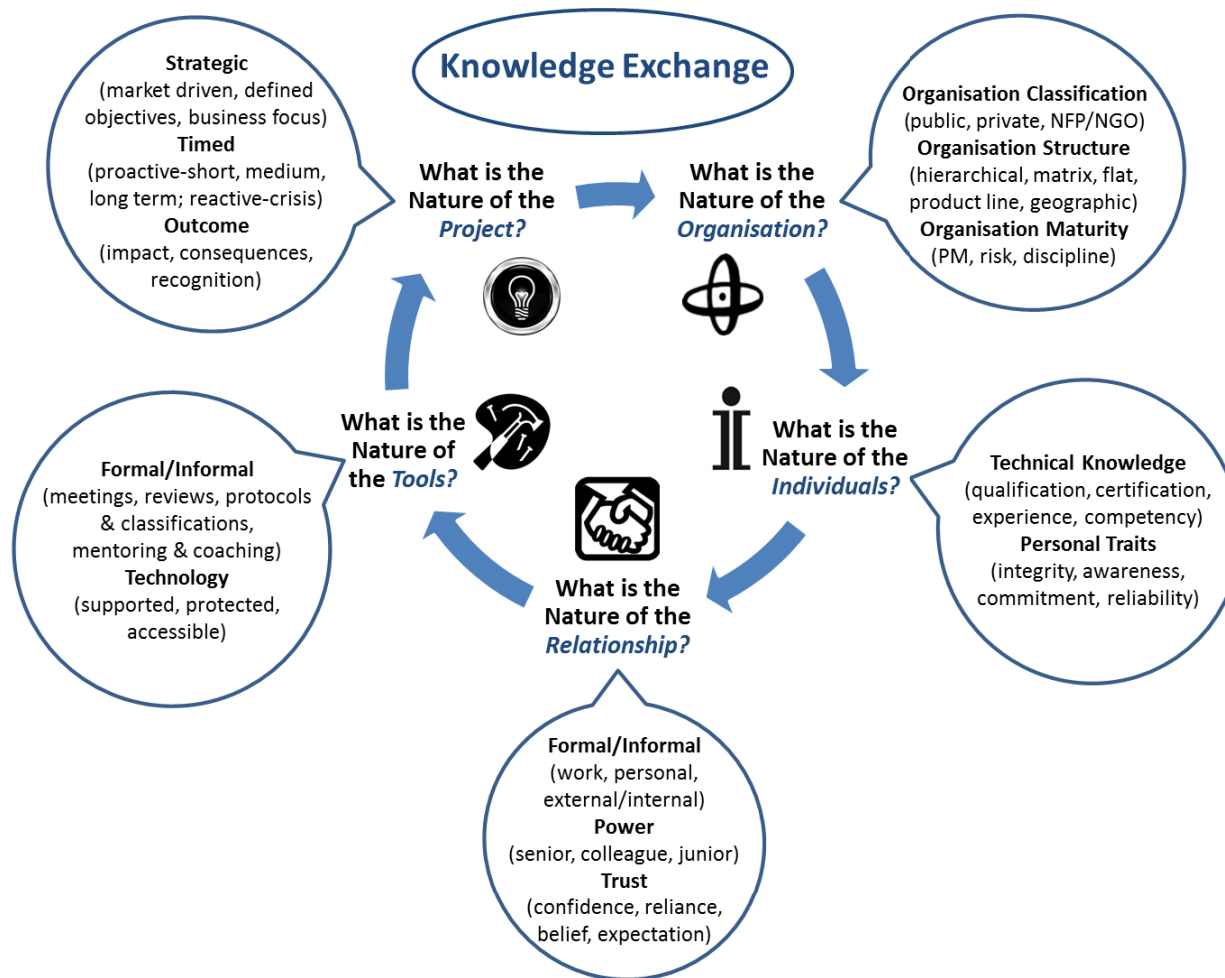


Diagram 3: Knowledge exchange instrument

The hard copies given to the research participant's included an A4 and pocket sized laminated diagram with text box instructions, and specific questions to trigger actions when exchanging knowledge in any situation.

The third intervention involved meeting individually with each research participant to hand over a hard copy of the knowledge exchange instrument and a brief on how to implement the tool. I also supplied the second reflective journal to capture how the knowledge exchange instrument was implemented. I contacted the research participants individually and arranged to meet Delta, Lima and Bravo in their offices. Sierra had relocated to Perth, in Western Australia, and Mike was located in Canberra, the capital of Australia, so they were sent their knowledge exchange instrument packages in the mail and I followed up with a scheduled phone call to impart instructions. There was an issue with contacting Whiskey as he was immersed in a review of the organisation so the meeting was delayed several weeks. After the briefings I contacted each research participant to schedule the fourth intervention focus group meeting to collectively discuss the implementation of the knowledge exchange instrument. The following section includes detail on the third intervention briefing meetings with each research participant. I describe the context of the briefing and my reflections on how the third intervention progressed. Some of the research participant's quotes refer to a cycle as this was the original term used for the knowledge exchange instrument.

### **Research Participant: Bravo**

#### Context:

The meeting with Bravo went longer than planned as he wanted to share stories about effective and ineffective communications, which was the term Bravo uses for exchanging knowledge. Bravo suggested what I am doing is investigating how people communicate, and most of the time communications were not planned and often relied on the experiences and intuition of the person leading the interactions. Bravo reflected on a recent project where Bravo had worked hard on delivering a project for a client Bravo had worked with for some time. The client had not paid substantial invoices and subsequently terminated the contract. Bravo had actively shared knowledge with the client and many stakeholders and trusted the client would behave in a similar manner, in particular, to pay bills.



### Researcher Reflections:

Bravo was concerned that he had openly shared personal knowledge and the client's he worked with can take advantage of this openness. Bravo wanted to share personal stories about the lack of project work his organisation has at the moment and the real concern for where projects were coming from. Bravo is also enjoying mentoring senior project managers as part of his organisation's commitment to developing talent from within the organisation.

### **Research Participant: Delta**

#### Context:

I met Delta in a meeting room and he brought his first reflective journal, although suggested not much content had been added. Delta also suggested he would continue to add to this journal over the following weeks. Delta understood the knowledge exchange instrument and recognised where his input had been included in regard to keeping the tool to one page and using icons to trigger actions described in more detail in the text box. Delta liked the two versions, A4 for the desk and the smaller pocket sized guide, and accepted questions would need to be asked only him could answer about the project environment. Delta noted the reflective journal inserts were easily understood, as they were similar to the first reflective journal inserts.

### Researcher Reflections:

The discussion was informal and friendly as Delta saw the value of using the knowledge exchange instrument and said Delta would possibly not make any changes to the format, although would capture any thoughts in the reflective journal.

### **Research Participant: Lima**

#### Context:

Lima had another meeting scheduled immediately after our briefing so we moved directly into an update on the research and the knowledge exchange instrument, where I described how to use the tool which he immediately understood. The reflective journal inserts were then discussed which took some time as Lima was unsure whether to answer the questions in the reflective journal or those on the knowledge exchange instrument.

### Researcher Reflections:

Lima was very relaxed and shared sensitive work and personal information which showed me he had a high level of trust in our relationship. Lima was managing an additional time constrained, project and the current project was dependent on this project. Lima immediately saw the benefit of using the knowledge exchange instrument as a tool to manage these time constraints by communicating more effectively with the external project management consultants and the internal project team, who were all missing project deadlines.

**Research Participant: Mike**

Context:

I briefed Mike over the phone at a scheduled time, although he had already read through all the material. I then gave a summary of the status of the research and went through the knowledge exchange instrument in more detail to ensure Mike had interpreted the instructions as intended. Mike had pre-prepared some questions which were to confirm if he was to use the knowledge exchange instrument or if he was to brief his team to use the knowledge exchange instrument. I confirmed it was Mike who would be using the knowledge exchange instrument and capturing the process in the reflective journal. The second question was to confirm the knowledge exchange instrument did not have to follow a sequential order, which you could move between the various questions, which I confirmed was possible, and expected.

Researcher Reflections:

Mike was very organised, with specific questions and ideas for further application of the knowledge exchange instrument. Mike asked if the knowledge exchange instrument could be shared with an industry association as he was identifying how to improve coaching practices. I was concerned about the use of the knowledge exchange instrument at this stage of development and before it had been reviewed and published in my thesis, so I asked if we could wait until after the research was completed. Mike agreed, and understood the need to maintain confidentiality of my research.

**Research Participant: Sierra**

Context:

I attempted to contact Sierra several times by phone. When successful, Sierra advised me he had relocated to Perth and was working as a contract project manager. I discussed with my

research Supervisor if I could continue to include Sierra in the research after he had changed organisations. I then sent Sierra the knowledge exchange instrument and reflective journal inserts and made an appointment to give a brief over the phone.

#### Researcher Reflections:

Sierra was very keen to implement the knowledge exchange instrument and said it was ideal timing due to the new project manager's role with a major utility. Sierra said the reflective journal could not be located after moving to a different state and was upset as he had written notes in the knowledge exchange instrument and would try to locate it. Sierra said he would apply more diligence when reflecting on the use of the knowledge exchange instrument, and looked forward to sharing these reflections at the focus group meeting. Sierra believed using the knowledge exchange instrument would assist with the transition into a new environment which was very different to the previous organisation.

#### **Research Participant: Whiskey**

##### Context:

I had contacted Whiskey several times by phone leaving voicemail messages and followed up with an email which resulted in setting a meeting with him after the focus group meeting due to his annual leave. I was diligent to ensure when I briefed Whiskey I excluded comments from the focus group meeting. Whiskey saw the benefit of the knowledge exchange instrument and understood how to implement the tool, and to capture how this was accomplished in the reflective journal.

##### Researcher Reflections:

I understood Whiskey had other professional and personal priorities which delayed the briefing meeting and required a one-on-one interview in place of the collective focus group meeting. Whiskey was keen to implement the knowledge exchange instrument as he was managing a challenging environment with changes in the workplace resulting in a reduction of staff and spending on projects.

#### **Summary of Intervention Three—Knowledge Exchange Instrument Briefings**

The addition of this third intervention to brief the research participants gave me another valuable interaction to further develop our working relationship. They were keen to understand how to implement the knowledge exchange instrument, but what appeared to be

of more value was their need to update me on the progress of their projects, and in particular the issues they were facing with challenging situations. This need was not anticipated and resulted in more time being spent in the briefing meeting than was planned. The research participants quickly understood how to implement the knowledge exchange instrument, as they had input into the design of the tool and I included detailed instructions. However, I was surprised with several questions from those I did not meet face-to-face in regard to how to implement the knowledge exchange instrument. The confusion arose when a research participant was attempting to answer the questions in the knowledge exchange instrument and the separate questions in the reflective journal. I developed more detailed notes to assist the research participants with completing their reflective journal, and on how to implement the knowledge exchange instrument. These more detailed explanations were aimed at assisting in the focus group meeting, as the discussion would be centred on how the research participants implemented the tool.

### **4.5.3 Action Research Cycle 3: Evaluation of Implementation of Change**

#### **Intervention Four—Focus Group**

The intent of the focus group meeting was to evaluate the implementation of a change in the research participants' practice through using the knowledge exchange instrument. I developed a series of questions to ask the collective group of research participants so they could interact and the discussion could lead into common or different areas to identify gaps and overlaps.

The following five questions were asked:

Question 1: What was *positive* about the knowledge exchange instrument?

Question 2: What was *negative* about the knowledge exchange instrument?

Question 3: What was *unusual* or different about the knowledge exchange instrument?

Question 4: Did anybody actually *change* the knowledge exchange instrument?

Question 5: Did the knowledge exchange instrument change anybody's *behaviour*?

The logistics of the meeting needed to be managed carefully as one of the research participants, Sierra, had relocated to Perth and required permission from the new employer to access a video link. This was not approved, so a teleconference call was booked. Whiskey was

unable to participate in the focus group meeting due to other commitments so I arranged a separate meeting with him using the same questions used in the focus group. A description of the context of both the focus group meeting and the subsequent meeting with the absent research participant is described in the same structure as for the first two interventions in terms of the context and my reflections.

#### Focus Group Context:

The focus group meeting involved five of the research participants—being Bravo, Delta, Lima, Mike, and Sierra. Mike drove for three hours from Canberra for the meeting and, as Sierra had relocated to Perth on the west coast of Australia, we agreed to use the Skype video call facility. A few days before the focus group meeting, Sierra advised his employer would not allow a Skype call so his contribution would need to be made by a phone call at the meeting on a speaker phone. The meeting room needed to be reconfigured by a technician as there was no telephone in the room. I had also arranged for the focus group meeting to be video recorded, as well as digitally audio recorded. The addition of the video recording was to ensure I was able to capture all the conversations and cross check the data against the digital recording. The two mediums also minimised the risk if one did not work the other medium could be used for transcription purposes.

A member of the external reference group attended the focus group meeting and assisted in clarifying some of the discussion while I was interacting and capturing what the research participants were saying. At the conclusion of the focus group meeting I collected the reflective journals and thanked the research participants for their significant contribution to the research. I also reminded them the data would remain confidential and they would all receive a hard copy of the final published thesis.

#### Researcher Reflections:

During the focus group meeting the research participants were fully engaged and contributing to the discussion, in particular Sierra who was participating by phone. I was concerned before the meeting began the conversation may be less open and they may only give brief, non-controversial answers to the questions. This concern was based on the research participants not knowing each other, and the attendance of an external reference group member. I was also concerned they may not be constructively critical with their feedback on the knowledge exchange instrument due to a close working relationship with each research participant. These concerns were allayed as within five minutes of everyone arriving, and making the necessary

introductions, they were all actively engaged in the discussion. This almost instant camaraderie was potentially the result of all research participants going through the same set of interventions and, although physically independent of each other, this was a shared experience.

During the focus group meeting I was cautious not to add my own perspective to the discussion so as to minimise any potential bias, although at times I needed to refocus the discussion to answer the questions. I found this to be a challenge as I could empathise with the experiences of the research participants due to my previous experience as a project manager.

#### Subsequent Interview:

I met with Whiskey to discuss the same questions presented to the other research participants in the focus group meeting. The meeting was held in the informal eating area at Whiskey's office and I digitally recorded the meeting. I showed Whiskey the questions I was going to ask and he was well prepared, as I had sent an email earlier reminding him of the purpose of the meeting. Whiskey did not bring the reflective journal and said it would be sent in the following week. Whiskey had photocopied the diagram of the knowledge exchange instrument and had written on it to cross check steps taken to exchange knowledge on two projects. Whiskey had also hand drawn his own rendition of the knowledge exchange instrument to demonstrate how it could be modified to suit his projects.

#### Researcher Reflections:

During the meeting Whiskey was very relaxed and it was obvious he had tried to implement the knowledge exchange instrument, modifying it to suit his requirements. Whiskey explained there was difficulty with the many large strategic projects not following the standard project management approach, and yet agreed knowledge exchange was critical for future successful outcomes. The work Whiskey was currently involved in appeared to be onerous and required a focus on cost cutting while still delivering agreed outcomes. The distraction of thinking about how to exchange knowledge, which Whiskey suggested was essential to the organisation, appeared to create a tension between what he was expected to deliver immediately and the desire to invest in higher quality and longer term outcomes.

## **Summary of Intervention Four–Focus Group**

The focus group meeting created a collaborative environment for the research participants to share their common experiences of the first three interventions, and the implementation of the knowledge exchange instrument. The involvement of the research participants in suggesting the requirements for the knowledge exchange instrument and then participating in the focus group meeting allowed them to evolve from a research *informant* to a *research partner*. As we moved through the questions, the collaborative discussion accelerated the areas the research participants found worked for them compared to those needing to be changed. This collective sharing of knowledge gave all who attended the focus group meeting a sense of belonging to a community who had undergone a unique experience.

When I met separately with Whiskey, there was no feeling expressed of being segregated. Even though Whiskey was unable to join the focus group meeting, the time I spent talking through his implementation of their adapted knowledge exchange instrument was valuable. It may have been a less dynamic experience for Whiskey, however he was able to contribute to the discussion and the observations and issues were captured so I could analyse them with the other research participants. I thought the closure of the focus group meeting was premature as I did not want to end my contact with the research participants. However, I needed to focus on analysing the data and completing the research.

## ***4.6 Data Analysis***

To analyse the data I revisited the two focus themes of the research: to identify how project managers *acquire* knowledge; and how project managers *exchange* knowledge. These two themes are depicted in the following sections as ‘Part 1: How Do Project Managers Acquire Knowledge?’ and ‘Part 2: How Do Project Managers Exchange Knowledge?’ In Part 1, Questions 1, 2 and 3 are sourced from intervention one and analysed. In Part 2, Questions 4, 5 and 6 are sourced from intervention one, with observations from intervention two and intervention four then analysed. The data in Part 1 was examined separately for each research participant. In Part 2 the data from each research participant was examined individually and compared to data collected in intervention one and two. This enabled me to compare what the research participant said they did, what their work colleague said they did, and what I observed them actually doing to exchange knowledge.

The research participant’s dialogue and actions were analysed using selected techniques from grounded theory (Charmaz 2006; Glaser 1978; Strauss & Corbin 1998). To undertake analysis

of the content of the transcriptions, I extracted direct quotes from the appropriate sections of the digital recordings of the interviews and focus group meeting. As the observation days did not involve any digital recordings, I have summarized my notes to reflect the research participants' actions, interactions and discourse. The diagram referred to in 'Chapter 3: Research Methodology and Methods' has been highlighted below in Figure 22 to focus on Step 3 Data Analysis and the approach followed to analyse the data collected from the interventions.



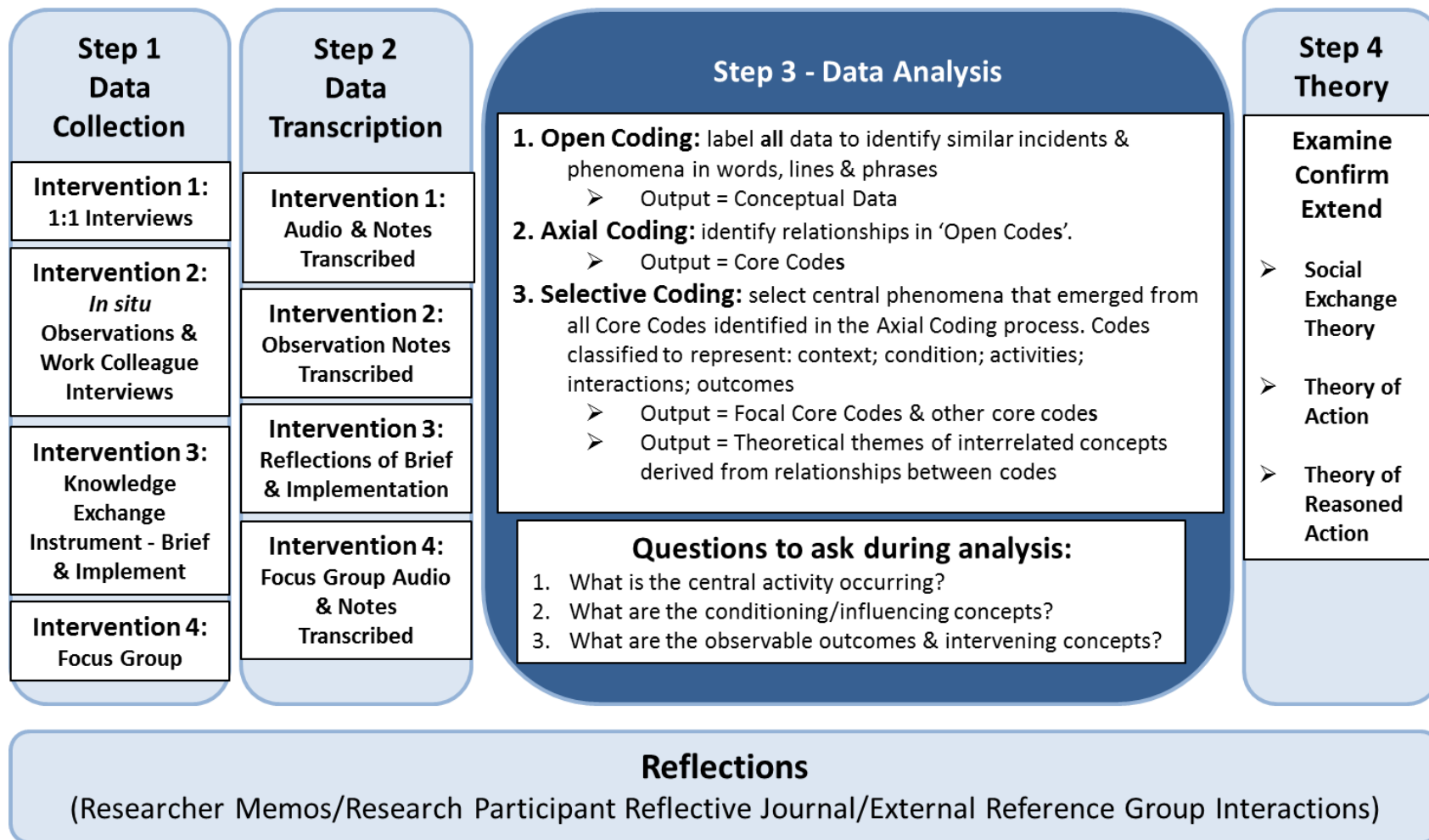


Figure 22: Data analysis approach—step 3

The process of 'Open Coding' was followed where I labelled all the data collected from notes and transcripts to identify similar incidents and phenomena which resulted in the formation of 'Conceptual Data'. To do this I entered all the raw data into a table in a Word document and worked through all of the words, lines and paragraphs to label all the data. The data was tagged with an 'N' if it was related to my notes or as a 'T' if it was directly from a transcript. The data was then transferred into Excel worksheets to accommodate more information, such as initially the question number, and further into the analysis, the categories, which could then be sorted by any criteria which emerged to cluster specific data for more detailed analysis. The Excel worksheets were printed onto differing coloured paper to align to the colours used to identify each research participant, with the codes cut into strips by each question and reviewed closely for emergent categories, which formed the conceptual data.

The next step in analysing the data was to progress to 'Axial Coding' to identify the relationships in the 'Open Codes' which then formed the 'Core Codes'. The output of these core codes was described as 'Theoretical Themes' of interrelated concepts derived from relationships between the codes. To complete this step, I entered the core codes into a table in categories representing context, condition, activities, interactions, and outcomes. As the data was grouped into categories it enabled me to identify the size and relative prevalence of each category. To be able to make observation and comparisons I chose to use spider diagrams as this was a way to document and compare themes and patterns among and between the research participants'. The spider diagrams present a visual representation of the similarity and dissimilarity of the responses by category across all interventions for each research participant. The tendencies were then compared across each intervention to address the research questions of how project managers acquire and exchange knowledge. A map to represent the data analysis progression has been developed in Figure 23 and Figure 24 on the next two pages.

To remain close to the data, the analysis of the interviews, observations, notes, and reflective journals was managed through a combination of manual paper based sorting and classifying before engaging with computer generated output. I had tested the data in NVivo and was concerned the NVivo process created output potentially limiting my findings. As Fielding and Lee (1998) suggest, one of the issues of using computer software for analysing data is it creates distance between the research participants and the researcher. The combination of manual and computer aided approaches allowed interpretation of the data with greater efficacy which was limited when I investigated the sole use of software maps such as NVivo

and Atlas.ti. The spider diagrams were informed by the data and were created from the inside to the outside, rather than the usual approach where pre-existing dimensions are used to measure from the outside to the inside. The number of data points emerged from the natural groupings. As such, the number of data points varies from three to nine in the spider diagrams showing the natural groupings and their relative prevalence to each other.

The next two pages present a map of the data collection, transcription and analysis steps in the research. The examples were created from intervention one and Question 1 from the interview with the research participants. I have included in '1. Open Coding;' an image of the spreadsheet table with in the left column my raw notes taken from the interview with Delta and in the right column the 'Data labels' I developed. In example 1.2, I show the data labels as they were represented in tables noting Question 1 with a '1N' for notes, and a '1T' for the transcribed data labels. In example 1.3, the image showed the data labels sorted by categories into '2. Axial Codes'. The example shown for '3.1 Selective Coding' continues with the same question and research participant to demonstrate how the core codes were collated and then tabulated in 3.2 so as to produce the spider diagrams in 3.3.

**1. Open Coding:** labelled all data to identify similar incidents & phenomena resulting in Conceptual Data, eg Intervention 1, Q1 How became PM

I started the interview by asking DELTA about his qualifications. He said he completed a Civil Engineering degree with Honours at Royal Melbourne Institute of Technology (RMIT) and also a Master of Legal Studies at the University of New South Wales (UNSW). DELTA has also completed an internally run 'PMP' Advanced Diploma in Project Management through a competency assessment.

DELTA said he studied engineering to become a project manager. He enjoyed maths and science early in high school but did not like the design aspect.

He enjoyed the practical stuff he could construct something with his hands and as did his high school work experience with an electrical engineer which he did not enjoy. This changed DELTA's focus to civil engineering as he liked the idea of making things 'fit together', leading to an interest in how activities can be integrated. He also liked the image of a project manager 'cruising around construction sites with a hand hat on the back seat of a four wheel drive car'.

DELTA learnt about the discipline of project management at school and enjoyed the logical way projects can be managed.

DELTA majored in project management as another way to do 'anything to get out of design'.

He started his engineering degree at Sydney Uni and found the lectures were disjointed and became disinterested. He then took two years before returning to his degree, this time at RMIT as his parents had moved to Melbourne and he needed their support.

DELTA has moved back to where he grew up in the Blue Mountains and enjoys working at Sydney Water, where he has been since graduating from RMIT.

DELTA started his first job, luckily, on a project team with a subsidiary of Sydney Water - Australia Water Technologies. Normally Sydney Water recruits graduates to the workplace on a three year graduate program, rotating roles every 12 months. His first project was to assist the project manager to deliver a capital project - delivering rebarcuted sewerage systems in the Blue Mountains.

DELTA then moved on to a \$20 million sewerage upgrade project that involved an expression of interest, procurement and contracts and the ability to manage a project using a permit in the city and Goulburn area. This was initial phase of a larger project which DELTA then continued with assisting a different project manager with the delivery phase of the same project. This was a three year project in the Wollongong area where he also was the project manager on smaller projects at the same time. The main project was made up of a large multi-disciplinary team and DELTA's role was to take minutes at meetings, manage the contract payments and action what needed to be done. His role also included being the interface between the management contractor and the plant. This was a challenge as the project was to double the size of the existing plant and introduce automated processes that were quite different to previous projects.

The Workplace Accommodation project that DELTA worked on involved building the new premises and then relocating all head office staff from the city to these new premises in Parramatta. He was personally motivated to finish this project as he lives in the Blue Mountains and the commute would be significantly reduced. It was also a rare opportunity for DELTA to work on a construction project.

DELTA is now working on projects in the wider Sydney region.

DELTA worked on projects of the treatment plant upgrades and upgraded the

Undergraduate civil engineering degree, post graduate legal degree and an Advanced Diploma in PM  
Moved around for qualifications - Melbourne, Sydney

Focused on studying project management

Practical interest in constructing integrated solutions

Had ideal image of the pm 'cruising around construction sites with a hand hat on the back seat of a four wheel drive'

Interest in logic of science and management

Studied pm to move away from design

Studying was interrupted when support moved, ie family

Relocated back to childhood suburb

First job was on a project team with a subsidiary of the current employer in his residential area  
Next project was assisting on the initial stage of a large infrastructure project in a regional area  
Went on to assist PM to deliver project which double the capacity of the service  
Managing multiple small projects while assisting on large project  
Recent work on a different discipline-based project with high level human impact  
Managing more people focused

**1.2**  
Data labels entered into table  
'N' = Notes & 'T' = Transcript

N	Undergraduate civil engineering degree, post graduate legal degree and an Advanced Diploma in PM	Same organisation has provided many
N	Moved around for qualifications - Melbourne, Sydney	To become a project manager needed to study another discipline - chose civil engineering
N	Focused on studying project management	Enjoyed pulling things apart to see how they worked but not designing
N	Practical interest in constructing integrated solutions	Engineering emerged as a choice as enjoyed maths and science at school, and working on practical things with hands
N	Had ideal image of the pm 'cruising around construction sites with a hand hat on the back seat of a four wheel drive'	Tried electrical engineering initially but did not enjoy being in an office
N	Interest in logic of science and management	Found civil engineering suited his desire to build and integrate communities through infrastructure
N	Studied pm to move away from design	University study offered the design or pm path - he chose pm due to image of driving around construction sites
N	Studying was interrupted when support moved, ie family	Attracted to the science of project management
N	Relocated back to childhood suburb	Perception was that project management was unscientific and undisciplined, just organising and planning
N	First job was on a project team with a subsidiary of the current employer in his residential area	Studied a major in project management as part of civil engineering degree then employed by an infrastructure organisation
N	Next project was assisting on the initial stage of a large infrastructure project in a regional area	Started studying in Sydney then gave up due to commuting from long distance
N	Went on to assist PM to deliver project which double the capacity of the service	Two years later moved to Melbourne with family and studying there then returned to Sydney
N	Managing multiple small projects while assisting on large project	Not determined to be a project manager
N	Recent work on a different discipline-based project with high level human impact	First job was with current employer nearly 15 years ago working in a project team
N	Managing more people focused	Three year graduate program rotated you to three different business units
N	Only people focused projects undertaken	Only civil engineer in graduate program and worked on tenders within a subsidiary in his residential area

**1.1**  
Interview transcribed on left & all data labelled on right

**2. Axial Coding:** identified relationships in 'Open Codes' resulting in Core Codes

**1.3**  
Coloured labels cut & sorted into similar categories, forming 'Conceptual Data'

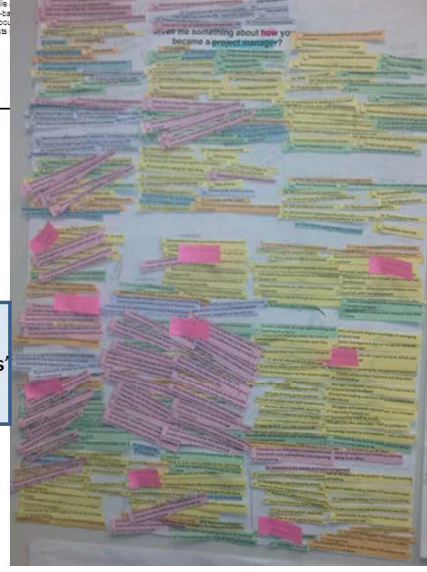


Figure 23: Data analysis progression

**3. Selective Coding:** central phenomena emerges from Core Codes Output resulting in a theoretical framework, eg Intervention 1, Q1 How became PM

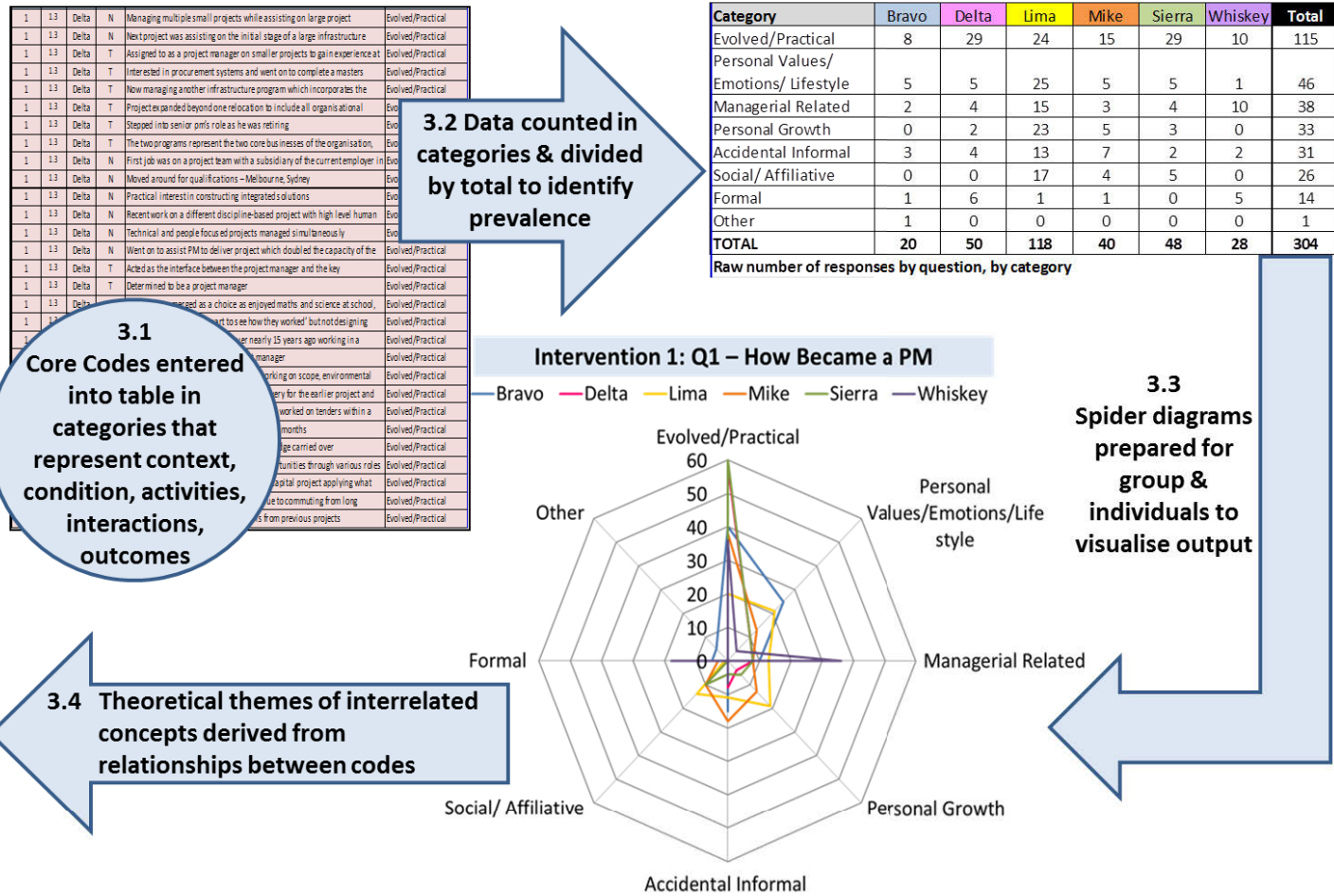


Figure 24: Data analysis progression

#### 4.6.1 Part 1: How Do Project Managers *Acquire* Knowledge?

To demonstrate how the research participants *acquire* knowledge I have described them individually and as a group. The data originated from the interviews conducted in intervention one. In this intervention, I met with each research participant for a one hour interview which was digitally recorded and I also took handwritten notes. The interview questions were designed to ascertain how the research participant acquires and exchanges knowledge. To gain a level of rapport and build trust I asked one open question and allowed the research participant to speak with minimal interruptions for 25 minutes. I then asked five focused questions, the first three being designed to gather information on how they acquired their knowledge, with the last two questions looking into how they exchanged knowledge and the impact relationships and the environment have on knowledge exchange. The questions focusing on the acquisition of knowledge will be described in the following section, detailing individual responses after providing a summary of the responses from the research group for each question.

#### **Intervention One Analysis: Interviews**

**Question 1:** *Tell me something about how you became a project manager?*

The first open question from intervention one asked the research participant to tell me something about how they became a project manager. The data was initially analysed using all the observation codes from each research participant. There were a small number of comments from Lima not relevant to the research as they distracted from the investigation into how the research participants acquired their project management knowledge. The comments included statements such as:

*'I felt as if I didn't know anything and I felt as if when I first started work I actually had to start from scratch again.'* (Lima)

*'I started losing confidence. I was at the stage where I thought I'm no good elsewhere. What do I know and so on. That's when I realised that I needed to get out.'* (Lima)

*'People are laughing at me and thinking I've got a project plan for myself.'* (Lima)

These comments were saved in the data files, although not included in the analysis, to be able to clearly identify what responses were similar or dissimilar for comparison and clustering into categories.

The responses from the research participants were divided into categories emerging from the data. To arrive at the categories, the conceptual data (in the form of coloured strips of paper with participant data) was manually spread across a large table and similar word groupings were placed together. I then created headings to represent a common meaning for the data. The headings created from the conceptual data were categorised into the following groups, with supporting quotes from the research participants included to demonstrate the range of responses within each category. A complete set of quotes by category is included as Appendix 1–DAQ for reference:

- The research participant developed into a project manager through practical experiences.

Category: Evolved and Practical

*'I guess just through time, projects happen and you know, you might be the technical lead for that project and you slowly become the contact for the business. Then you're suddenly managing projects.'* (Lima)

*'I moved into a project officer position. Then that progressed as I became more experienced and qualified. I then became a project manager.'* (Sierra)

*'I managed a few of those [projects], then a few more and a few more. When I'm not acting in this role I'm now managing that program. So that's just built up over time.'* (Delta)

- The research participant chose the career of a project manager to suit their personal values, subjective impressions, or lifestyle.

Category: Personal Values, Emotions, and Lifestyle

*'I could at least add value and bring some of the lessons that I've learnt along the way across to that team as well.'* (Sierra)

*'The construction appealed to me and the dream of cruising around in my four wheel drive with my hard hat on the back seat and turning up at site and pulling out the blue prints and that sort of thing.'* (Delta)

- The research participant refined their project management skills through relating to management and the requirements of the organisation.

- Category: Managerial Related

*'I started to become more and more managerial type of responsibilities I believe as a result of being up front and enjoying the communication piece as well as the technical piece.'* (Mike)

*'[I] then learned over time as I did more of the managerial pieces to refine my organisational skills around it.'* (Mike)

- The research participant was driven to become a project manager through their personal drive to develop their skills.

Category: Personal Growth

*'I wanted to make sure that the next place that I went to that I got proper training.'* (Lima)

*'I would say I learned through my own attempt, right or wrong, on observation. I had a couple of very good mentors. I was very, very fortunate in my career in [Company X] in that I was given things and allowed little failures.'* (Mike)

- The research participant accidentally or informally became a project manager.

Category: Accidental and Informal

*'If we fail forward, you turn the failure into a learning moment. You absolutely absorb the learning moment, and then you adjust with the learning moment. That's what I mean by failing forward. Let's fail forward.'* (Mike)

*'That took some practice and I think that's where the training, sometimes by fire, was needed, in my particular case.'* (Mike)

- The research participant saw the role of being a project manager as part of a social or networking opportunity.

Category: Social and Affiliative

*'So that's why I was quite happy to go and work on that project at [Company Z] because I knew him and I knew how good he was. I wanted to work with him again.'* (Lima)

*'I was very, very interested in infrastructure. I liked the way different things could fit together. You could build communities and you could build societies.'* (Delta)

- The research participant followed more formal channels to become a project manager, and in some cases relied on formal approaches to develop skills.

Category: Formal

*'I became an engineer first. But I really became an engineer to become a project manager.'* (Delta)



*'I suppose having discussions and bringing together our knowledge around the improvements which we could do and how we could change things and formalise things.'* (Sierra)

The key outcomes from analysis of Question 1 data indicated:

- The combined group showed a pattern indicating a high association where five of the six research participants had their greatest response in the category of 'Evolved and Practical'. There is no other category showing this pattern in this question.
- Bravo, Delta, Mike and Sierra exhibited patterns closely aligned with the group prevalence.
- Whiskey showed a similar result for 'Managerial Related' and 'Evolved and Practical'.
- Lima's responses were evenly spread across the categories of 'Evolved and Practical', 'Personal Values, Emotions and Lifestyle', and 'Personal Growth'.

A summary of the research participants' individual responses to how they became a project manager are shown below in Figure 25 and showed the majority of the research participants evolved in their project management roles through practical experiences.

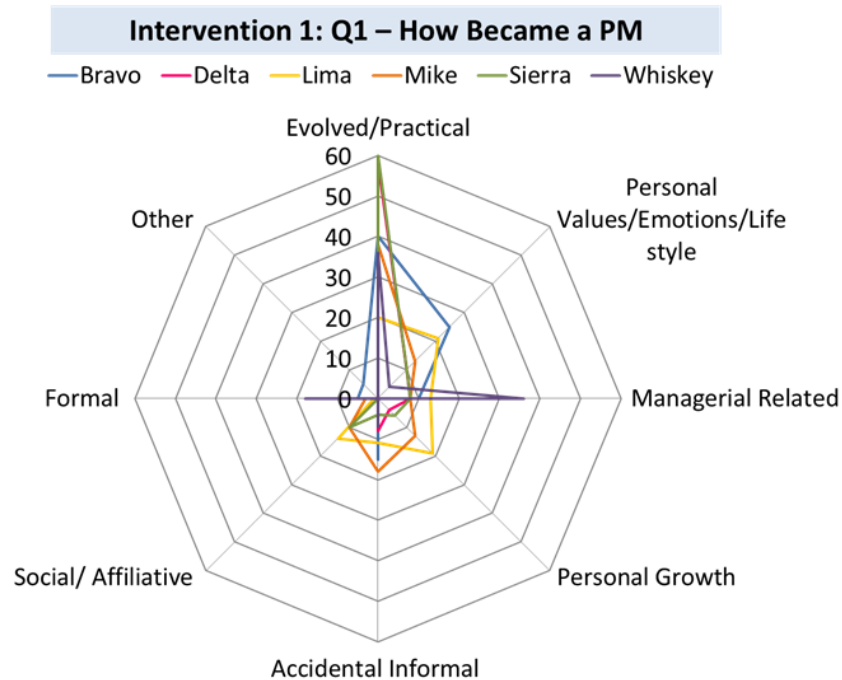


Figure 25: Question 1—how research participants became a project manager

The subsequent interview questions in Part 1, intervention one were designed as focused questions, with Questions 2 and 3 aligned to Part 1 and Questions 4, 5 and 6 analysed in Part 2. The questions I will describe in this section refer to the acquisition of knowledge, and will be

described as previously with a group summary followed by the individual responses from each research participant.

**Question 2:** *Education—what significance did formal project management training have on your development as a project manager?*

The second question in intervention one related to project management education and asked the research participant what significance formal project management training had on their development as a project manager. The categories of responses were formed by the data clustering into three areas:

- Project management training imparts some foundational building blocks for the research participants' knowledge.

Category: Foundational Information

*'Definitely you have to have the education, but that's a guideline.'* (Lima)

*'There were a few different courses which I did together for the project management qualifications.'* (Sierra)

*'At university is where I realised that project management actually had a discipline to it.'* (Delta)

- The research participant used both formal project management training and practical experience to develop their project management skills.

Category: Integrated with Work Experience

*'I'll be honest - I don't think I've been to an effective project management training course yet. I gave up on them fairly early in the piece I think. The background I got at university I thought was very good. On the job training is where it's all at.'* (Delta)

*'Project management boot camp - the first week was theory and structure and processes and methodology and training in [Company X]'s methodology. The entire second week was a case study with role playing.'* (Mike)

- The research participant said project management courses created the catalyst to investigate additional development options.

Category: Catalyst for Other

*'I probably would have done a Masters in something, but not to be. That didn't happen.'* (Bravo)

*'I did toss up doing the Master of Project Management but in looking at it in quite a bit of detail I thought I'd just be learning what I already knew.'* (Delta)

The key outcomes from analysis of Question 2 data indicated:

- The combined group showed dominance in the 'Integrated with Work Experience' category with four of the six research participants showing this pattern for more than half of their responses, with Mike's comments only in this category.
- Delta, Lima, Mike and Whiskey showed a pattern generally aligned to the group profile.
- Sierra and Bravo responded to the question by saying the most significant aspect of formal project management training was to develop foundational Information.

A spider diagram representing the data analysed for this question has been included in Appendix 1–2 for reference.

**Question 3:** *Experience—how do you gain your project management experience?*

The third and final question in Part 1 related to how the research participants gained their project management experience. The conceptual data formed into several categories of responses indicating they gained their project management experience through:

- Formal project management systems.

Category: Formal

*'We developed a project management roadmap which is an attempt at a generic type of approach to managing a project that can be tailored for specific clients.'* (Whiskey)

*'It was filed in systems accessible and if you took the time to do it, the archive of lessons learned was there.'* (Mike)

*'Is quite bureaucratic and it's got well established ... project delivery management system.'* (Delta)

- Informally or accidentally working on projects.

Category: Informal and Accidental

*'I sort of started to fall a little bit towards project management because I actually wasn't a very good Structural Engineer.'* (Bravo)

*'[I] was called into my boss's office. He said do you know anything about tennis? I said oh yes I used to play tennis. Then good, well we need a project manager for the facility being built at Homebush and there are big games.'* (Whiskey)

*'It wasn't a planned career move by no stretch of the imagination.'* (Bravo)

- Unstated or implied experiences.

Category: Tacit

*'We actually did do quite a bit of - anybody that had been through the process before - other organisations - we tried to get out of their head what they'd done.'* (Delta)

*'I think the thing that ultimately is valuable and what it is that I've learned with the guidance of mentors and the ability to be able to engage in different projects and try different things, is foresight. It's easy to understand the methodology.'* (Mike)

- Decisions by management, minimizing risk on projects, and general project experiences.

Category: Management Decisions, Risk and Experience

*'Experience is totally important - totally. It's not only the experience, I think what I found is that I found it really, really useful to have a group of friends who are either managers or project managers or in some sort of leadership role that you can actually bounce ideas off.'* (Lima)

*'I've also been a bit of trouble-shooter for the firm. Projects in trouble, I get sent there. I call myself Red Adair [American oil well fire-fighter notable for his innovative approach to extinguishing and capping fires].'* (Bravo)

- Communicating and socializing with people.

Category: People Related, Communications and Social

*'There wasn't anybody else at that time that I could learn from. I think I stumbled through it for a while. Then we had a bit of a restructure and then I got exposed to a couple of other areas that were in a different department who had now been moved up into our space. These people also had experience in projects so that's when we started talking to each other and saying, you've done this project or you're doing this project. You know, the work you are doing, how are you doing it? What documentation are you using? Let's have a look at it.'* (Sierra)

*'We started sharing documents and sharing information about how we would do certain things and also working with different resources as well. We were able to transfer a bit of an insight as to how best to work with certain people.'* (Sierra)

- Adapting to different situations.

Category: Adaptive and Situational

*'I've had some brilliant clients and I've had some absolute clients from hell. Absolute clients from hell. [You need to] be able to adjust your behaviour and your communications.'* (Bravo)

*'So it's modifying, you base what you're doing on your experience but you also draw in experts once you've identified what they are - what's required.'* (Delta)

- Evolving into the project management role.

Category: Evolved Hybrid

*'As soon as you get into something a bit different then you have to start working on that yourself and developing different ways and methodologies.'* (Delta)

*'I was on contract staff initially for six months, but then I transitioned to permanent employment.'* (Bravo)

- Other non-traditional experiences.

Category: Non-traditional

*'You need to be courageous enough to try something new. I took that to heart.'* (Mike)

The key outcomes from analysis of Question 3 data indicated:

- The combined group showed a cluster of responses in three disparate categories indicating no clear consistent patterns of how the research participants gained their experiences. The three most prevalent categories were 'Formal', 'Informal and Accidental', and 'Tacit' channels. Four of the six research participants had one of these three categories as their highest response rate for this question.
- The most dominant category differed for each of the research participants, with the following evidence: Bravo—'Informal and Accidental'; Delta—'Adaptive and Situational'; Lima—only one category of responses which was for 'People Related', 'Communications and Social'; Mike—'Tacit'; Sierra—similar ranking for 'Formal' and 'Management Decisions', 'Risk and Experience', and Whiskey—'Formal'.

A spider diagram representing the data analysed for this question has been included in Appendix 1–3 for reference.

**Question 4:** *What is the value of project management associations in your Personal development?*

The first question in Part 2 addressed how project managers exchange knowledge, investigated the impact of project management associations on the research participant's personal development. The conceptual codes formed into the following three categories which describe the research participants' perception of project management associations' impact on their personal development.

Category: Negative and Low Value

*'It was all very superficial from my perspective. For me it wasn't real and I thought I'm not getting any value out of this. I get more value just from talking to my ex-colleagues or friends about their experiences when I need real help.'* (Lima)

*'The networking I thought was quite onerous - young family and that sort of thing. So I thought not right now.'* (Delta)

Category: Neutral and Mixed

*'I don't know that in my case [memberships] played a particularly substantial role.'*  
(Mike)

*'It's still of interest, but I don't have time. It's not a priority for me now. I don't even really get any benefit out of those memberships.'* (Sierra)

Category: Positive and Valuable

*'You engage in a thought or a process experiment associated with it is that you've heard ... and had me consider some new and different ideas.'* (Mike)

*'I went there because I thought maybe I'll learn something.'* (Lima)

The key outcomes from analysis of Question 4 data indicated:

- The combined group showed prevalence for project management associations having a negative and low value for four of the six research participants, with only Sierra suggesting he had a positive and valuable impact.
- Bravo, Lima and Whiskey exhibited a generally negative pattern.
- Delta showed a view balanced among all three dimensions with Mike having a 'Neutral and Mixed' view.

A spider diagram representing the data analysed for this question has been included in Appendix 1–4 for reference.

In the second and third action research cycle the focus of my investigations was on how the research participants exchanged knowledge. This is reviewed in Part 2 where I describe the action research cycles and the data I collected.

## **Summary of Intervention One Analysis: Interviews**

The analysis of how the research participants acquired their project management knowledge was based on the responses to four interview questions I asked in the first intervention. The first open question asked the research participants how they became project managers, which found it was predominantly through evolving into the role by way of practical experience. In some cases their career progression and personal growth assisted in this evolution. The next three focused questions in Part 1 were designed to understand how the research participants acquired their project management knowledge. In regard to how the research participants used project management training to develop their skills, the responses indicate the majority saw skill development integrated with work experience, with only a small proportion using formal training to develop their foundational project management skills. The second focused question in Part 1 asked the research participants how they gained their project management experience. The majority of the research participants used formal maps and techniques available in the workplace where they were employed as a project manager. They were gaining experience informally or accidentally, where they were unexpectedly doing the work they did, or where they had unstated or implied project management experiences. The last question in this section aimed to identify what value the project management associations had on the research participants' personal development. This question found the research participants had an overall view of industry associations contributing little or no value to their professional development. There was no consistent dominant category for any of them.

### **4.6.2 Part 2: How Do Project Managers *Exchange Knowledge*?**

To describe how the research participants exchange knowledge I started with focused questions in the interviews conducted in intervention one where they described what they did before I observed what they actually did to exchange knowledge in their workplace. The framework for this investigation is based on management research conducted by Kotter (1999a, 1999b), and Mintzberg (1980a) who investigated what managers and leaders said they did and what they actually did. Their research and the research of other early researchers, such as Carlson (1951), Martin (1956), and Stewart (1967) is described in more detail in 'Chapter 3: Research Methodology and Methods'.

## **Intervention One Analysis: Interviews**

**Question 5:** *Can you tell me something more about how you exchange knowledge on your projects and across the organisation?*

The second question in Part 2 asked research participants to describe how they exchanged knowledge while working on projects. This question is compared later in ‘Section 4.6.2 Part 2: How Do Project Managers Exchange Knowledge?’ to the data gathered from intervention two, specifically Question 3 from the work colleague interviews, and from my *in situ* observations. The conceptual data led to six categories which were further refined in the analysis of the data from the *in situ* observations into four categories. The original six categories identified the research participants exchange knowledge in either a highly structured, or formal context, or in a casual or informal context. Within these two categories, the responses were clustered into whether the exchange occurred ‘Impersonally’ or ‘Personally’. These two categories referred to the manner in which the knowledge was exchanged, such as a report would be referred to as ‘Impersonal’ and a work chat over coffee was considered ‘Personal’. Finally, some responses were a mixture of other responses within each of the ‘Formal’ and ‘Informal’ categories, and these were classified as a ‘Blended’ response. The following Table 17 contains quotes representing each of these categories.

Table 17: Research participant category quotes

Category	Research Participant Quote
Impersonal & Formal	<p><i>‘We’ve got an IT system that enables project staff to put lessons learned in when they come across an issue on a project.’ (Whiskey)</i></p> <p><i>‘Our post implementation reviews and our business realisation reviews and all those sorts of things. That’s where a lot of the stories come out.’ (Delta)</i></p>
Impersonal & Informal	<p><i>‘To me the training - the knowledge I’ve gained as a project manager has come down to how good my managers and my peers were at imparting that knowledge.’ (Delta)</i></p> <p><i>‘You find a way to shortcut and the procedures and to get around, you know to get around them and still not get a black mark.’ (Bravo)</i></p>
Personal & Formal	<p><i>‘They want us to start with a story. It’s not a project report. It’s a story. Which is going to be interesting for a bunch of middle aged engineers to try and get their head around that.’ (Delta)</i></p> <p><i>‘But they’re not just telling stories for that sake. It’s really related to something that’s going on and usually there’s a lesson out of it that you can apply to that.’ (Delta)</i></p> <p><i>‘They would go ‘not another story’. But it’s said in a joking manner. Everybody else shared their experiences as well.’ (Lima)</i></p>



Category	Research Participant Quote
	<i>'Often it's not the words that they use but how they actually say it and what they're doing when they say it.'</i> (Delta)
Personal & Informal	<i>'There are a lot of informal discussions which are constantly occurring in our team.'</i> (Sierra)  <i>'It was a conversation over lunch where you really got the whole story, the big picture and what really went on.'</i> (Delta)
Blended Other & Formal	<i>'Quite often your information, in terms of the processes and procedures are from the last job you did.'</i> (Bravo)  <i>'The more we can make information more readily assessable to staff the less we're going to make the same mistakes over again and the quicker they can get on and do things.'</i> (Whiskey)
Blended Other & Informal	<i>'You learn a little bit from good projects, but you learn a lot more from bad projects.'</i> (Bravo)  <i>'Information shared is better than information retained.'</i> (Whiskey)

The key outcomes from analysis of Question 5 data indicated:

- The combined group showed a pattern indicating association with a broad 'Impersonal' approach to knowledge exchange with data from five of the six research participants indicating this was their preferred way of exchanging knowledge. Further analysis of the data indicated nearly half the research participants exchange knowledge 'Formally', yet a quarter used 'Informal' approaches.
- Bravo, Delta, Sierra and Whiskey had patterns closely aligned with the group prevalence.
- Mike was also generally aligned to the group but in a slightly different way due to a preference for a more 'Formal' approach when the exchange was 'Personal'.
- Lima was an outlier as there was a tendency to use a more 'Personal' approach.

A summary of the research participants' individual responses to Question 5 are shown below in Figure 26.

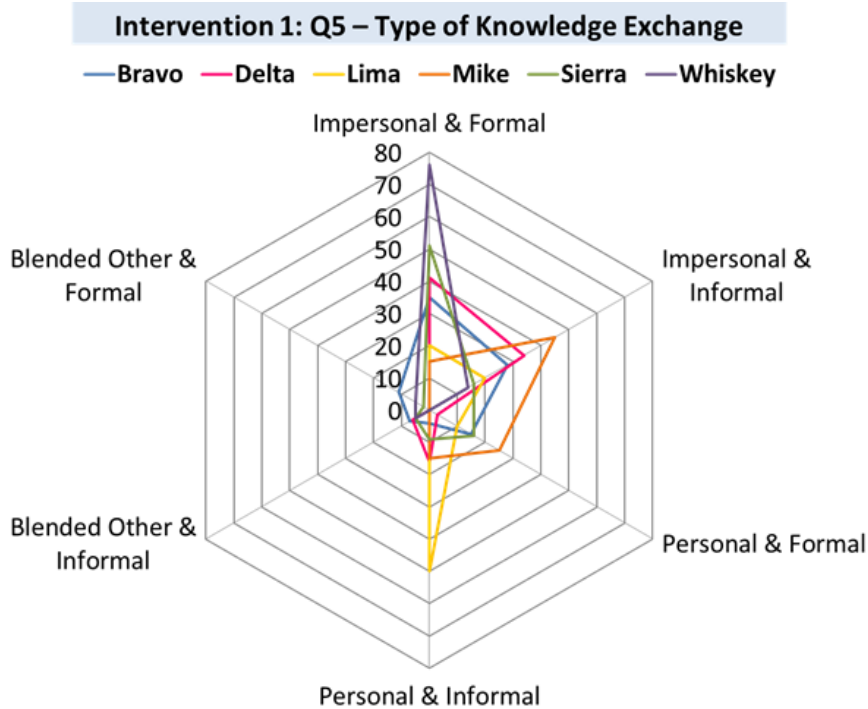


Figure 26: Question 5—research participant responses

**Question 6:** *What is the significance of interpersonal relationships and the organisational climate in exchanging knowledge?*

The final focused question in the interview asked research participants to describe how significant relationships and the organisational climate were in exchanging knowledge. The conceptual data formed into two categories based on whether the exchange of knowledge was focused on *relationships* or *tasks*. The data was then clustered within these two categories as to whether the responses from the research participants related to the research participant (Category: Self), the Organisation (Category: Organisation), or the Project Team (Category: Team). The multiple levels of analysis are depicted below where the categories are aligned to quotes from the interviews with each research participant.

Category: Relationships—Organisation

*‘We need to run our contracts in a relationship sort of a basis rather than the old adversarial way.’ (Delta)*

*‘Following up on the culture workshop. How’s it going in your area? You know what behaviours are you noticing changing? What could we do better? That sort of thing.’ (Whiskey)*

Category: Tasks–Organisation

*'We've created a culture website which has got all the plans for all the business units so everyone can see what everyone else is planning to do. There's already been some cross fertilization in that.'* (Whiskey)

*'Each of those business units has got a culture action plan.'* (Whiskey)

Category: Tasks–Self

*'It's about doing jobs. It is about connecting the dots. It's about getting things done.'* (Bravo)

*'I'm always happy to change something if somebody has a better idea or if something is not working discuss it and move on.'* (Lima)

Category: Tasks–Team

*'They're [the team] thinking in terms of the environment, the behaviours, the culture.'* (Mike)

*'We've been able to put some sort of control around what happened and put some actions in place where other people have got a bit of comfort as well.'* (Sierra)

Category: Relationships–Team

*'As a project manager I guess my philosophy is make the best use of your people in the team, for what they are there for.'* (Lima)

Category: Relationships–Self

*'The biggest influence on the behaviours of individuals is the team leader.'* (Whiskey)

The key outcomes from analysis of Question 6 data indicated:

- The combined group showed a pattern indicating a focus on the 'Organisation' when exchanging knowledge, with an almost equal preference for using 'Relationships' and 'Tasks' to exchange knowledge.
- Delta, Sierra and Whiskey had patterns closely aligned with the group prevalence, with their first two major responses being focused on the 'Organisation', and equally split between 'Tasks' and 'Relationships'.

- Lima and Mike were less aligned with the group as they were more oriented toward using 'Tasks' as the vehicle to exchange knowledge for themselves and their teams.
- Bravo was focused primarily on relationships with the team when exchanging knowledge.

A spider diagram representing the data analysed for this question has been included in Appendix 1–6 for reference.

### **Summary of Intervention One Analysis: Interviews**

The analysis of the subsequent two focused questions was to elicit how the research participants exchanged knowledge. The first question in this section framed how the data was to be compared across several interventions, as it specifically asked the research participants how they exchanged knowledge. The data indicated the preferred way of exchanging knowledge was using a 'Formal and Impersonal' approach, although there were several outliers who tended to be more 'Personal' depending on the where the knowledge was being exchanged. The next question in this section asked the research participants to comment on the impact of interpersonal relationships and the organisational climate on exchanging knowledge. The data led to identifying an almost equal split between focusing on relationships and tasks when they exchange knowledge.

### **Intervention Two Analysis: *In Situ* Observations**

The data analysed from the *in situ* observations, which were conducted in the research participants' workplaces, was collected using a protocol detailed in 'Chapter 3: Research Methodology and Methods'. The exchanges of knowledge I observed during the second intervention were classified as either 'Impromptu' or 'Planned', and were all verbal, with the following examples of the classifications used in the observation protocol:

#### 'Impromptu':

- Verbal–Distant (IVD): virtual, for example, phone calls, Skype calls with no visual
- Verbal–Face-to-Face (IVF): physically present, for example corridor discussions, Skype calls with video

#### 'Planned':

- Verbal–Dialogue (PVD): virtual, for example, teleconferences, video conferences

- Verbal–Face-to-Face (PVF): physically present, for example, meetings, presentations

The analysis of the data collected during the second intervention formed into four categories of responses. The data indicates the research participants exchange knowledge in either a ‘Formal’, as in a highly structured interaction, or ‘Informal’, such as a casual context. Within these ‘Formal’ and ‘Informal’ categories, the responses were clustered into whether the exchange of knowledge occurred ‘Impersonally’ or ‘Personally’. These ‘Impersonal’ and ‘Personal’ categories refer to the *manner* in which the exchange of knowledge occurred, such as a report would be referred to as ‘Impersonal’ and a coffee meeting was considered ‘Personal’. The data was then further analysed within these four categories to review if the knowledge was exchanged according to the observation protocols of being ‘Impromptu’ or ‘Planned’.

In addition to the four approaches to exchanging knowledge, the data was categorized to represent the different ‘Status Levels’ the research participants interacted across the organisation when exchanging knowledge. These Status Levels have been grouped according to whether the research participant was exchanging knowledge with people:

- At the same level of responsibility–Status Level: *Peers*;
- At a more senior level of responsibility–Status Level: *Above*;
- At a more junior level of responsibility–Status Level: *Below*, or
- In a group with several different levels of responsibility – Status Level: *Mixed*.

The analysis of the conceptual data has been described in the following section according to the level of the people with which the research participant was exchanging knowledge, and within each of these groups, the manner in which the exchange occurred.

### **Exchanges with ‘Peers’**

The outcomes from analysing how the research participant interacted with those at a similar level as of responsibility themselves include:

- The only two research participants I observed exchanging knowledge with their *Peers* were Whiskey and Bravo. They both demonstrated a dominant ‘Impersonal’ manner in their knowledge exchanges, yet each conducted their exchanges in opposing contexts, with Whiskey using more ‘Formal’ arrangements and Bravo more ‘Informal’ arrangements.

- Bravo was also observed exchanging knowledge in a 'Personal' manner a quarter of the time, as did Whiskey for even less time, using 'Informal' approaches but equally in an 'Impersonal' and 'Personal' manner.
- Delta, Lima, Mike and Sierra had no responses to this observation.

A spider diagram representing the data analysed for this observation has been included in Appendix 2–P for reference.

When further interrogating the data through using the observation protocol of whether the exchange of knowledge occurred in a 'Planned' or 'Impromptu' way when working with *Peers*, the responses indicated the research participants only exchanged knowledge in 'Impromptu' situations, and when doing so in more than half of the observations, it was in an 'Impersonal and Formal' manner. A spider diagram representing the data analysed for this observation has been included in Appendix 2–P/C for reference.

### **Exchanges 'Above'**

The emerging areas from the conceptual codes formed from observing the research participants exchanging knowledge with those *Above* their level of responsibility, include:

- The combined group showed four of the five research participants had data in this area were heavily focused in an 'Impersonal and Formal' approach to knowledge exchange.
- Mike and Sierra had patterns closely aligned with the group prevalence while Lima had only data in the 'Impersonal and Formal' category.
- Delta, in the majority of interactions with senior managers, mainly exchanged knowledge in an 'Impersonal and Formal' way, although the opposite approach was used in less than a quarter of the interactions.
- Bravo was an outlier as he interacted with senior managers in nearly half of the interactions in a 'Personal and Formal' way and a quarter of the time in an 'Impersonal and Informal' way.
- There was no data associated with Whiskey.

A spider diagram representing the data analysed for this observation has been included in Appendix 2–A for reference.

Further review was undertaken into whether the exchange of knowledge occurred in a 'Planned' or 'Impromptu' way when working with those *Above* the level of responsibility of the

research participants. The data indicated for 'Planned' interactions an 'Impersonal and Formal' approach was dominant and in an 'Impromptu' situation and the majority of the interaction was 'Personal and Formal'. A spider diagram representing the data analysed for this observation has been included in Appendix 2–A/C for reference.

### **Exchanges 'Below'**

The key areas of interest emerging from the data indicate when the research participant exchanges knowledge with those *Below* their level of responsibility:

- The combined group showed a dominant approach of being 'Impersonal and Formal' when exchanging knowledge, with Lima, Mike, Sierra and Whiskey having the highest responses in both these categories.
- The lowest category across all research participants was for 'Personal' exchanges, with Bravo, Lima and Whiskey in the 'Personal and Informal' category, and Mike and Sierra in the 'Personal and Formal' category.
- Bravo was an outlier as the data was evenly spread across all categories with no obvious dominance.
- There was no data associated with Delta.

A spider diagram representing the data analysed for this observation has been included in Appendix 2–B for reference.

Interestingly, upon further investigation the research participants exchanged knowledge more than half the time in an 'Impersonal and Formal' manner in both the 'Planned' and 'Impromptu' classifications. A spider diagram representing the data analysed for this observation has been included in Appendix 2–B/C for reference.

### **Exchanges 'Mixed'**

The categories formed from the data when observing the research participant interacting with a group including people with several different levels of responsibility, indicate:

- The combined group showed a pattern heavily shifted toward 'Impersonal and Formal' indicating the preferred approach to knowledge exchange.
- Delta was strongest in the 'Impersonal and Formal' approach, with a minor indication he also exchanged knowledge in a 'Personal and Informal' manner.

- Whiskey was also predominantly ‘Impersonal and Formal’ in his approach to knowledge exchange, and observed to use an ‘Impersonal and Informal’ approach more than a quarter of the time.
- Bravo, Lima and Sierra were strongly oriented toward a ‘Formal’ approach to exchanging knowledge, and yet there was significant orientation toward both an ‘Impersonal’ and ‘Personal’ approach in these ‘Formal’ settings.
- There was no data associated with Mike.

A spider diagram representing the data analysed for this observation has been included in Appendix 2–M for reference.

When further interrogating the data on the exchange of knowledge in a ‘Planned’ or ‘Impromptu’ way with those in a *Mixed* group, the research participants were ‘Formal’ in the majority of ‘Planned’ interactions. The ‘Impersonal’ approach was used in all ‘Impromptu’ interactions, although equally split between using a ‘Formal’ or ‘Informal’ approach. A spider diagram representing the data analysed for this observation has been included in Appendix 2–M/C for reference.

### **Summary of Intervention 2 Analysis: *In Situ* Observations**

There was complete unity across the observations the research participants exchanged knowledge in an ‘Impersonal and Formal’ manner when interacting with those working as the four defined levels. The second strongest way research participants exchanged knowledge was in a ‘Personal and Formal’ manner primarily with those working *Above*, *Below* and in *Mixed* groups. However, at a *Peer* level this approach was not used, with the second strongest approach, after ‘Impersonal and Formal’, being ‘Impersonal and Informal’. A summary of the research participants overall approach to exchanging knowledge by their level of responsibility is shown below in Figure 27.



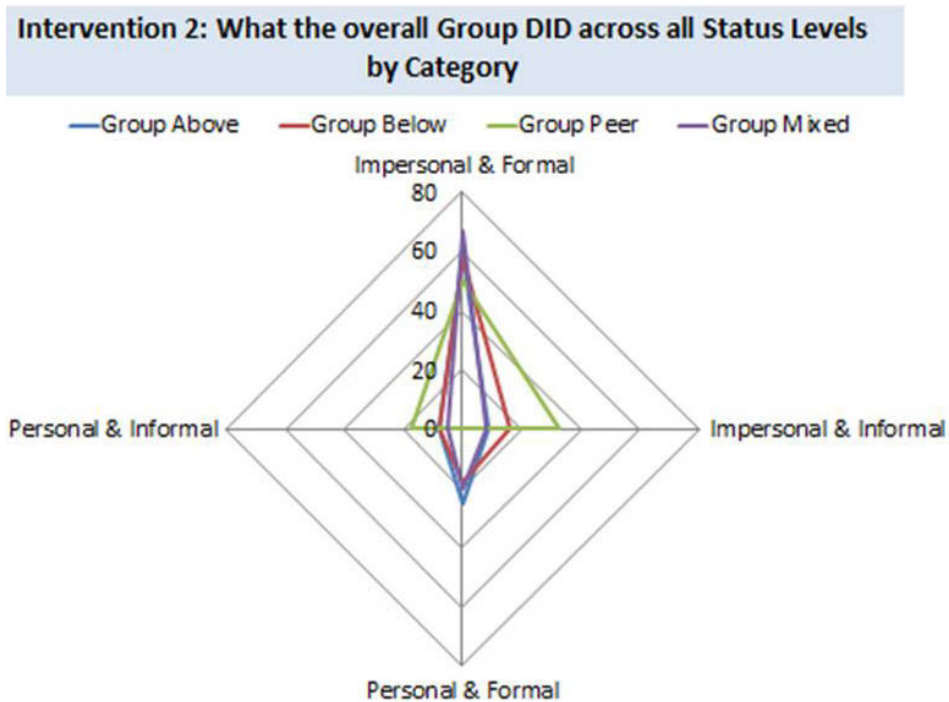
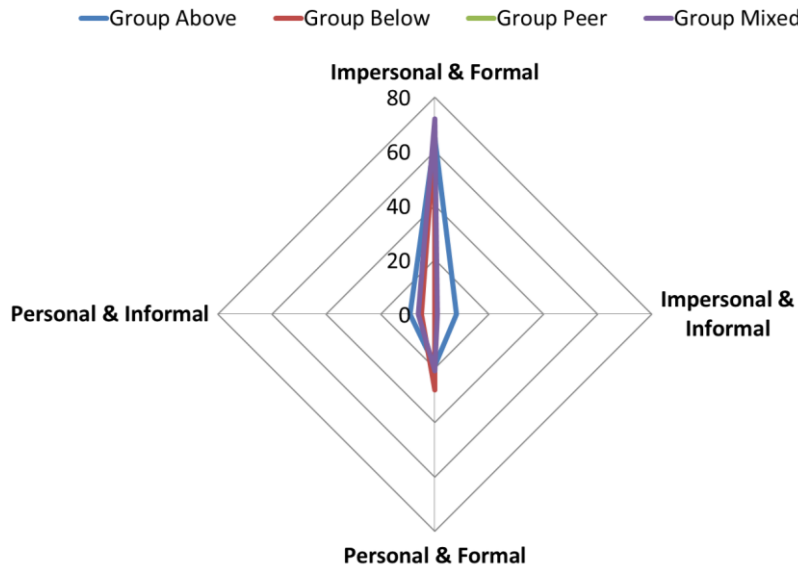


Figure 27: Observation of knowledge exchange across all status levels by category of responses

Further analysis of the data to understand whether the interaction was ‘Planned’ or ‘Impromptu’ found the research participants approached these situations differently. When exchanging knowledge in a ‘Planned’ situation the research participant was overwhelmingly ‘Impersonal and Formal’ in their approach to exchange knowledge. With *Peer* interaction, there was no clear indication in the group as interactions were limited. When the exchange of knowledge was ‘Impromptu’, a shift occurred and the research participants approached their senior managers in a ‘Personal and Formal’ manner. For interaction with those *Below* their level of responsibility, *Peers* and *Mixed* groups, the interactions continued to be ‘Impersonal and Formal’ but shifted somewhat toward ‘Informal’ behaviours. A summary of the research participants overall approach to exchanging knowledge in a ‘Planned’ and ‘Impromptu’ way is shown below in Figure 28.

**Intervention 2: What the overall Group DID across all Status Levels by Classification - PVF**



**Intervention 2: What the overall Group DID across all Status Levels by Classification - IVF**

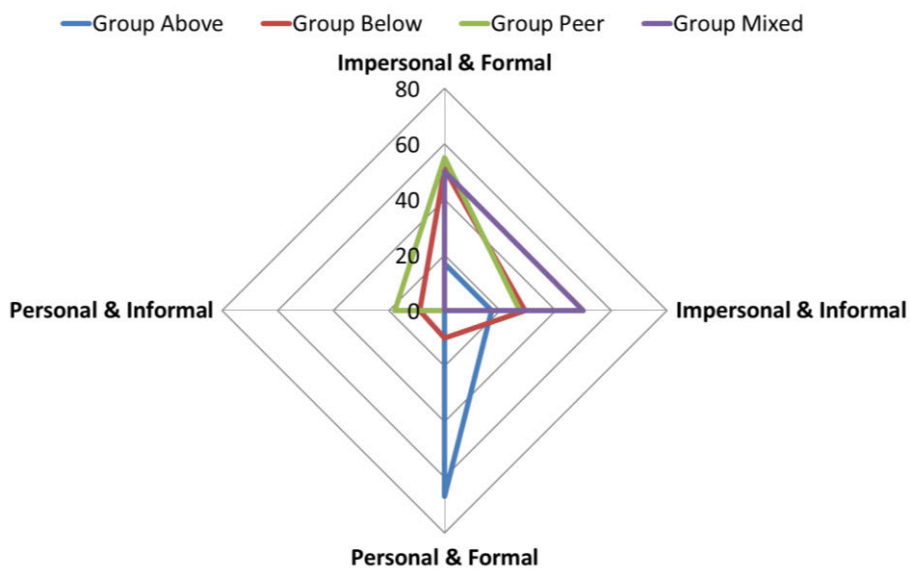


Figure 28: Demonstrating what the overall group of research participants did when exchanging knowledge in a 'Planned' (PVF) and 'Impromptu' (IVF) manner.

**Intervention Two Analysis: Work Colleague Interviews**

During the observation day at the research participant's workplace, I conducted an interview with a work colleague of the research participant's choice. The interview followed a similar line of questioning I had used when interviewing the research participants in intervention one,

except the interviews were not recorded at the request of the work colleagues. The categories of the responses captured in this section use the same definitions as in previous sections. The questions are described in terms of the intent of the question, the overall group responses, and then the individual research participant's responses.

**Question 1:** *Tell me something about how you share knowledge and possibly learn from the Research participant?*

The question asked the work colleague to describe how they observed the research participant exchanging knowledge, and if they had learnt anything from the exchange.

The results from analysing the data from Question 1 suggested:

- The combined group showed a strong indication of a 'Formal' approach as was observed by the work colleague when the research participant was exchanging knowledge. This was strongly demonstrated in four of the six research participants who have the paired dominant categories of 'Impersonal and Formal' with the 'Personal and Formal' categories.
- In individual research participant data the work colleagues of Delta, Mike and Sierra followed the group tendency.
- Whiskey was evaluated by his work colleague with a profile indicating the group dominance in the 'Personal and Formal' category, and yet moved into the 'Personal and Informal' category for over a quarter of his interactions, with no responses in the 'Impersonal' category.
- No data was identified for Bravo and Lima.

A spider diagram representing the data analysed for this question has been included in Appendix 2–1 for reference.

**Question 2:** *Experience—how does the research participant exchange their project management experience?*

The intent of this question was to ascertain how the research participant shared their project management experience with their work colleague/s.

The data emerging from an analysis of the interview responses from the work colleague suggested:

- The combined group showed work colleagues indicated a strong tendency for the research participants, as observed by their work colleagues to be 'Impersonal and Formal' when they shared their project management experience.
- Four out of six research participants, Delta, Lima, Sierra, and Whiskey, had between half and three quarters of their exchanges noted by their work colleagues as 'Impersonal and Formal'.
- Bravo's work colleague indicated he was also 'Impersonal' in his approach to sharing knowledge but in an 'Informal' way.
- Mike's approach from the work colleague was described as opposite to the overall group showing Mike only shared knowledge in a 'Personal and Informal' context.

A spider diagram representing the data analysed for this question has been included in Appendix 2–2 for reference.

**Question 3:** *Knowledge—can you tell me how the research participant exchanges knowledge on your projects and across the organisation?*

In this question I asked the work colleagues how they observed the research participant exchanging knowledge while working on projects and throughout the organisation. The data from this question was compared to the data from a similar question in intervention one, and my observations from intervention two, with the analysis in the next section.

The key outcomes from analysis of data from this interview question suggested:

- The combined group data indicated the work colleague saw the research participants exchanging knowledge in an 'Impersonal and Formal' context as the most prevalent category.
- Delta, Lima, Mike, Sierra and Whiskey all had a lesser secondary tendency, as observed by their work colleague, to exchange knowledge in an 'Impersonal and Informal' context.
- Bravo was observed by his work colleague to only exchange knowledge in an 'Impersonal and Formal' context.

A summary of the work colleagues individual responses to Question 3 are shown below in Figure 29.

### Intervention 2: Question 3 – Work Colleague Interview

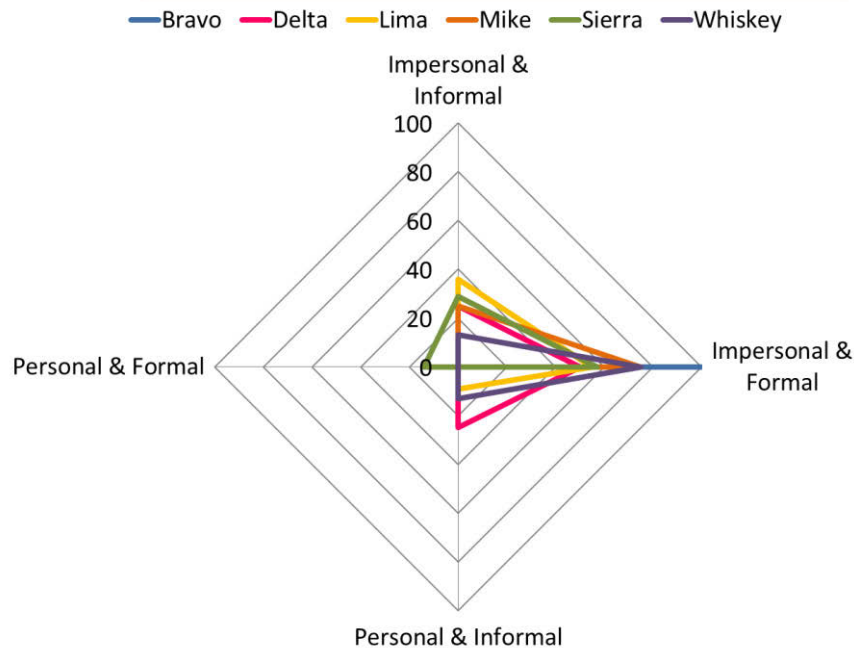


Figure 29: Work colleague responses to how their research participant exchanges knowledge while working on projects across the organisation

**Question 4:** Behaviour—how does the research participant manage interpersonal relationships in the organisation to exchange knowledge?

I asked a question of the work colleagues to investigate how the research participant engaged on an interpersonal level across the organisation when exchanging knowledge.

The key outcomes from analysis of the work colleague’s responses suggested:

- The combined group showed a strong tendency to manage interpersonal relationships in an ‘Impersonal and Formal’ context.
- Four of the six research participants, Lima, Mike, Sierra, and Whiskey were aligned with the group tendency, with their data indicating in well over half of their interactions they worked in an ‘Impersonal and Formal’ way when managing relationships.
- Bravo showed the same response data in both ‘Impersonal and Formal’ as well as ‘Personal and Formal’ contexts.
- The data analysed for Delta indicated he managed relationships only in a ‘Personal and Formal’ context.

A spider diagram representing the data analysed for this question has been included in Appendix 2–4 for reference.

**Question 5:** *Open—have you any other information that you can share with me to help me understand the way the research participant exchanges their knowledge?*

The final general question asked the work colleagues was to describe how the research participant shared their knowledge. This was similar to Question 3, with the term ‘share’ used instead of ‘exchange’ to identify any additional information not previously captured in the interview.

The key outcomes from analysis of this open question suggested:

- The combined group showed a dominant response where the work colleagues said the research participants’ shared knowledge in an ‘Impersonal and Formal’ manner.
- Bravo, Lima and Mike had all been observed by their work colleagues as only sharing knowledge in an ‘Impersonal and Formal’ context.
- Whiskey was an outlier with all responses in the ‘Personal and Formal’ context.
- Sierra had no data in this question.

A spider diagram representing the data analysed for this question has been included in Appendix 2–5 for reference.

### **Summary of Intervention Two Analysis: Work Colleague Interviews**

The interviews conducted with work colleagues of the research participants formed part of the second intervention and were based on similar questions I asked the research participants in intervention one. The purpose of the interviews was to understand from the perspective of those who worked with the research participant how they exchanged knowledge. In Questions 2, 4, and 5 the responses indicated a view of the research participant being very ‘Formal and Impersonal’ in their exchanges. When prompted to discuss matters relating directly to the work colleague ‘sharing knowledge...learning from the research participant’ (Question 1) or ‘the research participant exchanging knowledge on *their* project’ (question 3), the work colleague indicated ‘Impersonal and Informal’ behaviour was most prevalent. As a result, the views are somewhat mixed. Where the work colleague was most familiar and related most directly to knowledge exchange (Question 3), data is considered the most informed view by the work colleague and are used for comparative purposes in the following section.

## Comparing what was SAID with what they DID

The conceptual data analysed in the previous section has been further analysed by comparing three of the data sets, specifically capturing how the research participants exchange knowledge. This data derives from only the questions investigating how the research participant exchanges knowledge. The data was then overlaid to impart a perspective of what the research participant *said* about how they exchanged knowledge, with what they actually *did* to exchange knowledge, and what their work colleague *said* they did to exchange knowledge.

Specifically in the interviews conducted in intervention one, the fifth question asked the research participant to tell me something about how they exchange knowledge on their projects and across the organisation. In intervention two, I have included all the *in situ* observation data to bring a perspective of what the research participant was doing to exchange knowledge, as well as the third question from the interview with their work colleague, which asked them tell me how the research participant exchanges knowledge on their projects and across the organisation.

The categories referred to in the cross intervention analysis were initially formed when analysing the conceptual data for Question 5 in intervention one. A similar set of data-led categories was formed when analysing the conceptual data from the *in situ* observations in intervention two, and also for the data emerging from Question 3 in the interview with the research participant's work colleague.

The conceptual data led initially to six categories which were further refined while analysing the data into four categories. The original six categories identified the research participants exchange knowledge in either a 'Formal' or 'Informal' context. The 'Informal' examples of knowledge exchange were described in terms of casual interactions, whereas the 'Formal' context was structured. Within these two categories, the responses were clustered into whether the exchange occurred 'Impersonally' or 'Personally'. These two categories referred to the manner used to exchange knowledge, such as, a report would be referred to as 'Impersonal', and a coffee meeting was considered 'Personal'.

The two categories not remaining in the subsequent analysis of intervention one were where the data was a 'Blend' of other responses within each of the 'Formal' and 'Informal' categories. The commonality of the categories allows exploration of comparison between what the research participants *said* they did as opposed to what they actually *did*, noting the work

colleague has been classified in terms of what they said the research participant *did* to exchange knowledge.

The data was summarised across the overall group to identify any common or disparate tendencies. The categories were not predetermined or adopted from the first intervention, but appeared naturally through the data. These categories were established to allow for a more direct comparison within and across the blue, green and purple sources, as depicted in Figure 30 below.

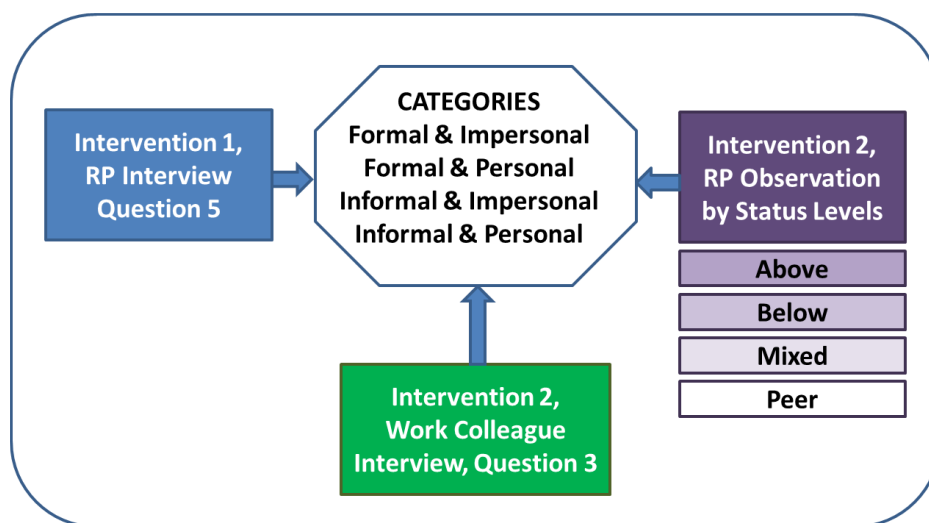


Figure 30: Process of comparing intervention 1 and 2 data to demonstrate the similar categories emerging from the conceptual codes

The following section presents the detailed analysis comparing what each research participant *said* they did to exchange knowledge, what they actually *did* to exchange knowledge, and what their work colleague *said* they did to exchange knowledge. The data is also supported in each case by a spider diagram and a per cent representation of the raw number of codes in each category to present a comparison of the tendencies.

### Comparative Data—Research Participant, Researcher and Work Colleague

The key outcomes from analysis of comparative responses between the research participant, their work colleague and I demonstrated:

- The data for the combined group *said* they exchanged knowledge in an ‘Impersonal and Formal’ way for almost half of their interactions, although I observed them exchanging knowledge in this way more than half the time in their exchanges.
- The work colleagues comments were not closely aligned with either what the research participant *said* they did or actually did. The work colleagues indicate some general



alignment with what the research participant *said* and suggested the knowledge was exchanged 'Informally' almost a third of the time.

- A notable difference between what the work colleagues *said* and what I observed indicates a disconnect between 'Formal and Informal' contexts in which knowledge was exchanged, however the 'Impersonal' category remained constant across all data sets.

A summary of what the group *said* they did when they exchanged knowledge, what they actually *did*, and what the work colleague said they *did* is shown below in Figure 31.

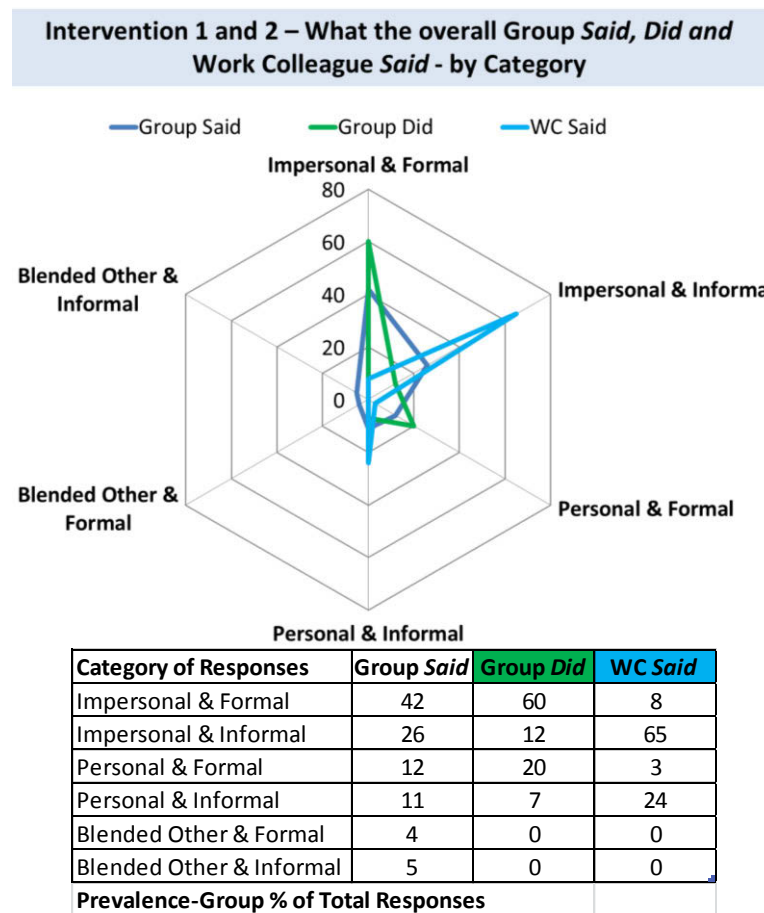


Figure 31: Cross comparison of what the group said, did, and what the work colleague said about how knowledge is exchanged

### Research Participant: Bravo

The key outcomes from analysis of Bravo's data demonstrated:

- Bravo *said* he exchanged knowledge predominantly in an 'Impersonal and Formal' rather than 'Impersonal and Informal' manner.

- I also observed Bravo almost equally exchanged knowledge in an ‘Impersonal and Formal’ manner, and in a ‘Personal and Formal’ manner.
- A notable difference was the work colleague indicated Bravo was seen to exchange knowledge always in an ‘Impersonal and Informal’ manner.
- The least likely way that Bravo would exchange knowledge through what Bravo *said*, what I observed Bravo *did*, and what Bravo’s work colleague *said* occurred was in an ‘Personal and Informal’ manner.

A spider diagram representing the data analysed for what Bravo *said* about exchanging knowledge, what Bravo actually *did*, and what the work colleague *said* Bravo did is included in Appendix 4–B/SDS for reference.

### **Research Participant: Delta**

The key outcomes from analysis of Delta’s data for demonstrated:

- Delta *said* knowledge exchanges were predominantly in an ‘Impersonal and Formal’ rather than ‘Impersonal and Informal’ manner.
- As I observed, Delta exchanged knowledge in an ‘Impersonal and Formal’ manner, yet occasionally Delta did this in a ‘Personal and Informal’ manner.
- A notable difference was the work colleague indicated Delta was seen to exchange knowledge more than half the time in an ‘Impersonal and Informal’ manner. Delta was also seen to spend equal amounts of time exchanging knowledge in opposite contexts, such as in an ‘Impersonal and Formal’ manner, or in a ‘Personal and Informal’ manner.
- The least likely way that Delta exchanged knowledge by what Delta *said*, Delta *did*, what I observed Delta *did*, and what Delta’s work colleague *said* occurred was in a ‘Personal and Informal’ manner.

A spider diagram representing the data analysed for what Delta *said* about exchanging knowledge, what Delta actually *did*, and what the work colleague *said* Delta did is included in Appendix 4–D/SDS for reference.

### **Research Participant: Lima**

The key outcomes from analysis of Lima’s data demonstrated:

- Lima *said* knowledge was exchanged half the time in a ‘Personal and Informal’ manner, yet he also suggested around a quarter of his time was spent exchanging knowledge in an ‘Impersonal and Informal’ manner.

- I observed Lima behaving in a manner differing from what he said and did, as he spent over three quarters of his time exchanging knowledge in an ‘Impersonal and Formal’ manner.
- Lima’s work colleague suggested Lima exchanged knowledge in an ‘Impersonal and Informal’ manner. The work colleague also said Lima exchanged knowledge in a ‘Personal and Informal’ manner.
- The least likely way that Lima exchanged knowledge by what Lima *said* he did and by what the work colleague *said* occurred, is in a ‘Personal and Informal’ manner. However, this is not what I observed, as Lima was the least likely in the group to exchange knowledge in an ‘Impersonal and Informal’ manner.

A spider diagram representing the data analysed for what Lima *said* about exchanging knowledge, what he actually *did*, and what the work colleague *said* Lima did is included in Appendix 4–L/SDS for reference.

#### **Research Participant: Mike**

The key outcomes from analysis of Mike’s data demonstrated:

- Mike *said* for nearly half the time he exchanged knowledge in an ‘Impersonal and Informal’ manner, yet I observed Mike exchanging knowledge in a more ‘Impersonal and Formal’ manner.
- Interestingly, Mike was the only research participant who had a high alignment with his work colleague for exchanging knowledge in an ‘Impersonal and Informal’ manner.
- The least likely way that Mike exchanged knowledge by what Mike *said* and what he *did* was supported by my observations for knowledge exchange to occur in a ‘Personal and Informal’ manner. Yet Mike’s work colleague suggested Mike would not exchange knowledge in a ‘Formal’ context either in an ‘Impersonal’ or ‘Personal’ manner.

A spider diagram representing the data analysed for what Mike *said* about exchanging knowledge, what Mike actually *did*, and what the work colleague *said* MIKE did is included in Appendix 4–M/SDS for reference.

#### **Research Participant: Sierra**

The key outcomes from analysis of Sierra’s data demonstrated:

- Sierra *said* knowledge was exchanged more than half the time in an ‘Impersonal and Formal’ manner. I observed Sierra exchanging knowledge as he had indicated, although in a more prevalent way.

- A notable difference to what Sierra said and did, and what I observed him doing was the work colleague suggested Sierra exchanged knowledge more than half the time in a 'Formal and Impersonal' manner, as noted by Sierra and myself.
- The least likely way that Sierra exchanged knowledge by what he *said* he *did* and what I observed, was in a 'Personal and Informal' manner. The work colleague suggested Sierra did not exchange knowledge at all in an 'Impersonal and Formal' manner.

A spider diagram representing the data analysed for what Sierra *said* about exchanging knowledge, what he actually *did*, and what the work colleague *said* Sierra did is included in Appendix 4–S/SDS for reference.

### **Research Participant: Whiskey**

The key outcomes from analysis of Whiskey's data demonstrated:

- Whiskey *said* over three quarters of his time was spent exchanging knowledge in an 'Impersonal and Formal' manner. I also observed Whiskey exchanged knowledge in this way, and as he had said, his second most prevalent way was to again to use an 'Impersonal and Informal' manner.
- Interestingly, Whiskey's work colleague suggested the opposite to what Whiskey had said and I had observed in regard to Whiskey exchanging knowledge in an 'Impersonal and Informal' manner.
- The least likely way that Whiskey exchanged knowledge by what he *said* he did, was supported by what the work colleague had observed, and that was to exchange knowledge in a 'Personal and Formal' manner. I was closely aligned to this outcome although I had observed the least likely way that knowledge would be exchanged to be in an 'Informal and Personal' manner.

A spider diagram representing the data analysed for what Whiskey *said* about exchanging knowledge, what he actually *did*, and what the work colleague *said* Whiskey did is included in Appendix 4–W/SDS for reference.

### **Summary of Comparative Data – Research Participant, Researcher and Work Colleague**

A comparison of what the research participant *said* about how they exchanged knowledge, what they actually *did*, through my observations, and what their work colleague *said* they did demonstrated some similarities in the conceptual codes and some significant differences. Overall, the research participant group data indicated they *said* they exchanged knowledge in

an 'Impersonal and Formal' way nearly half the time (the leading category) which was reflected in what I had actually observed. However, the work colleagues of the research participants suggested when they had observed them exchanging knowledge over half the time (their leading category) they indicated the research participants operated in an 'Impersonal and Informal' manner.

When delving deeper into the data for each individual research participant, I found again several consistent approaches, and some disconnects in how they exchanged knowledge. When looking into what each research participant *said* about how they exchanged knowledge, in all cases, except for Lima and Mike, they used an 'Impersonal and Formal' manner to exchange knowledge. When I observed the research participants exchanging knowledge all except Bravo were seen to behave in an 'Impersonal and Formal' manner. Further reviewing the data reveals interesting comparisons across the three sources: what research participants said in the interview; my direct observations of their activity; and the views of their work colleague. As a combined group, the leading category for the research participants was 'Impersonal and Formal'. My observations confirmed this tendency, but the combined data from work colleagues differed and showed 'Impersonal and Informal' as the dominant category. Further, examining the individual data the comparison is striking. Four of six research participants indicated 'Impersonal and Formal' behaviour to be dominant which matched my observation as depicted in column 1 in Table 18 below.

Table 18: Comparison of what the research participants said, did, and what their work colleague said they did to exchanges knowledge

Iteration	1	2	2	ALIGNMENT		
	Research Participant "Said"	Observed by Researcher	Work Colleague "Said"	Observer to Research Participant	Observer to Work Colleague	Colleague to Research Participant
<b>COMBINED GROUP</b>	Impersonal and Formal	Impersonal and Formal	Impersonal and Informal	Yes	No	No
<b>BRAVO</b>	Impersonal and Formal	Personal and Informal	Impersonal and Informal	No	No	No
<b>DELTA</b>	Impersonal and Formal	Impersonal and Formal	Impersonal and Informal	Yes	No	No
<b>LIMA</b>	Personal and Informal	Impersonal and Formal	Impersonal and Informal	No	No	No
<b>MIKE</b>	Impersonal and Informal	Impersonal and Formal	Impersonal and Informal	No	No	Yes
<b>SIERRA</b>	Impersonal and Formal	Impersonal and Formal	Impersonal and Informal	Yes	No	No
<b>WHISKEY</b>	Impersonal and Formal	Impersonal and Formal	Impersonal and Informal	Yes	No	No

My observations also indicated five of six research participants showing dominant 'Impersonal and Formal' behaviour in column 2 in Table 18 above. Surprisingly, the work colleague dominant category not only matched one of the research participant's *said* data (Mike) and none of my observations. The data for each work colleague matched each other, with all six work colleagues indicating 'Impersonal' and 'Informal'. While it was expected there might be some difference between my observations and the research participants' view of themselves, indicating less than perfect self-awareness, the result from the work colleagues was unexpected. With six separate work colleagues in different work organisations, industries, locations, and times I interacted with them, to indicate one particular category and completely align with each other, but not with the research participant, would indicate perhaps other factors at work.

### **Intervention Four Analysis: Focus Group**

The focus group meeting was planned to capture the impact of the knowledge exchange instrument on the way the research participants used this tool to exchange knowledge. The meeting was structured around five questions asking the research participants what they found was positive, negative, and unusual or different about the knowledge exchange instrument. The fourth and fifth questions asked if the research participants changed the knowledge exchange instrument to suit their needs, and if using the tool, from their perspective, caused a behavioural change in how they exchanged knowledge. The research participant who was unable to attend the focus group meeting was interviewed informally using the same questions asked in the focus group meeting. The responses to these questions were recorded, transcribed and coded to analyse the responses gathered from both the focus group meeting and the separate informal interview, which are combined in the following analysis.

After analysing all the responses, the conceptual data led to the formation of two common classifications used across all but question four. These classifications defined whether the knowledge exchange instrument helped the research participants to 'Think', which refers to planning, or whether the tool helped them to 'Act', which refers to actual activity, when exchanging knowledge. The following analysis is presented in question order with additional categories described within each question.

**Question 1: What was positive about the knowledge exchange instrument?**

The first question in the focus group meeting asked the research participants to discuss what they found was positive about using the knowledge exchange instrument in various job related activities to manage their projects. The responses to this question indicated the knowledge exchange instrument was used by the research participants *'Before the Meeting'*, *'During the Meeting'*, *'Post meeting'*, or *'Not Used'* at all. These categories were combined with the two classifications according to if the research participants used the tool to plan ('Think'), or undertake an activity ('Act').

The data collected from the responses to this question discussed in the focus group meeting were analysed and indicate:

- All the research participants' responses suggest the knowledge exchange instrument was a valuable tool to use *Before* meetings. This was represented by the majority of total responses, and within those responses nearly three quarters of the responses suggested 'Thinking' was the dominant category which indicates the knowledge exchange instrument was used for 'Planning' how to exchange knowledge *Before* an interaction.
- The second preferred use of the knowledge exchange instrument showed several inconsistencies, in regard to Bravo and Mike suggesting he used the tool to help them to plan ('Think'), but it was actually not used to take 'Action'.
- On the other hand, the next most common response from Delta and Whiskey suggested they used the tool to undertake activity ('Act') *Before* an interaction.
- Lima was equally likely to use the tool to 'Think' but not use it and to take action ('Act') *Before* an interaction.
- The least likely use of the knowledge exchange instrument was to use it to plan ('Think') *During* an interaction.

The following quotes from the research participants support the classifications into these categories.

Category: Help to THINK/Before Meeting

*'I did read the information and numerous times, mainly from a perspective of going into meeting situations, because every time when you go into a meeting you've got a different audience, different people, a different subject matter and you sometimes got - have different behaviours yourself and you speak differently.'* (Bravo)



*'It just made me stop and think about the preparation, it wasn't something specifically in there that said to change that but it was just a way that it was directing me to think.'* (Delta)

*'I pulled out the actual diagram and really thought to myself, okay, well I know what my standard agenda is going to be ... I use it as a map to say, what else can I get out of the meeting... so I'd sit down an extra 10 minutes and try to ... really kind of think it through, which I think added really a lot of value at the end of the day.'* (Sierra)

Category: Help to THINK/During Meeting

*'In terms of the Knowledge [Exchange] Cycle there's a certain amount of information and there's also behaviours that'll come out in that team [meeting].'* (Whiskey)

Category: Help to THINK/Post Meeting

*'I possibly would've given the same message almost the same way and that wouldn't have worked as effectively if I'd looked at the different people, the different target audience, different motivations, all those sorts of things.'* (Delta)

Category: Help to THINK/Not Used

*'My thought process of attending this meeting is (the knowledge exchange instrument is) not going to work structurally for me.'* (Mike)

Category: Help to ACT/Before Meeting

*'It did lead me to actually request a briefing beforehand so that I could talk to them, because I just knew that the individual and the relationship was there ... it was going to be a struggle for them.'* (Delta)

Category: Help to ACT/During Meeting

*'If we were actually conscious of how information and knowledge moved around the organisation, (knowledge exchange instrument) would help the performance of the organisation.'* (Whiskey)

Category: Help to ACT/Post Meeting

*'It was termed a lessons learned review but one of the critical things about it was about knowledge exchange.'* (Whiskey)

Category: Help to ACT/Not Used

*'Because it wasn't critical, it wasn't quite such a critical meeting.'* (Bravo)

A spider diagram representing the data analysed for this question has been included in Appendix 4–1 for reference.

**Question 2:** *What was negative about the knowledge exchange instrument?*

The next question I asked in the focus group meeting was to see what the research participants thought was negative about using the knowledge exchange instrument. The same classifications of 'Think' and 'Act' were found to be relevant from the data, with the addition of categories to describe if the tool would be more appropriate for the research participants if there were changes made to the tool to include additional information (Category: Additions), or removed some of the current information (Category: Deletions). The data was also sorted according to the research participants' suggestions the tool was practical (Category: Useful) or if it was impractical (Category: Not Useful).

The data collected from the focus group meeting was analysed and indicated:

- The group indicated they found the knowledge exchange instrument *Useful* to plan ('Think') in nearly a third of their interactions, with Bravo, Delta and Sierra showing this as their highest response category.
- Bravo, Delta, Lima and Sierra found the knowledge exchange instrument was *Useful* to help them 'Act' in around a quarter of their interactions.
- Lima and Whiskey predominantly used the knowledge exchange instrument to take action ('Act'), and suggested the tool need to have some *Additions*.
- There were also minor responses from Mike, Sierra and Delta to indicate the tool needed to have *Deletions* to help the research participants plan ('Think') or take action ('Act').

The quotes from the research participants reflect their negative feedback about the knowledge exchange instrument, noted below under each category.

Category: Help to THINK/Additions

*'You have to think about the habits of the recipient, are they detail oriented, do they want concepts, do they want to have a chat and do they want to see things ahead of time that they read and review?' (Mike)*

*'What is the nature of the tools, not did you use Excel or Microsoft Project, what are the nature of the tools and the nature of - okay, that's getting more interpretive.'*  
*(Mike)*

Category: Help to THINK/with Deletions

*'Cycles and the arrows don't add to the value of this thing. If anything in my mind it detracts from it.'* (Mike)

Category: Help to THINK/Useful

*'I'll do a complete assessment prior to walking into the room ... which are the type of things that are on here (knowledge exchange instrument) in different words.'* (Bravo)

*'I think with people at a lower level of experience, maturity and confidence it was great as a means of packaging their thought process as they're facing the project or project situation.'* (Mike)

Category: Help to THINK/Not Useful

*'Do you need to put something down that has some structure? Do they prefer not to have structure? I don't know anybody that's confident that needed this structure.'*  
*(Mike)*

Category: Help to ACT/with Additions

*'This didn't help me with the how. It just identified what I needed to look at but not how to approach it based on the scenario that I'm in.'* (Lima)

*'Most of the time I'm talking with senior people, they're thinking my business realisation and processes and the product, which is very, very lightly touched upon in the overt pieces of this model.'* (Mike)

Category: Help to ACT/with Deletions

*'It was about the barriers that might get in the way.'* (Delta)

Category: Help to ACT/Useful

*'I think you write it down and that was one of the main benefits as to how I - what I got from it, because by writing it down - because as I was saying, you have your stock standard agenda, you know yourself, you know what you've got to do, that's the easy stuff.'* (Sierra)

*'I use it in preparation for where I was trying to impart knowledge.'* (Delta)

Category: Help to ACT/Not Useful

*'I've got a lot of experience doing it but I wouldn't put myself in the expert category but at the same time I wouldn't take it along to a meeting, that would cause a lot of difficult situations but I would still get value when referring to it.'* (Sierra)

A spider diagram representing the data analysed for this question has been included in Appendix 4–2 for reference.

**Question 3:** *What was unusual or different about the knowledge exchange instrument?*

I asked the focus group whether they found anything unusual or different about the knowledge exchange instrument. This question was designed to compare the previous feedback and examine constructive ways of addressing any suggested modifications. These modifications were categorized by the responses into what was practical (Category: Used), what needed to be modified (Category: Changed), and what was impractical (Category: Not Used). Again, the classifications of 'Think' and Act' were addressed in the new categories identified from the data in this question.

Findings from analysing the data collected in the focus group meeting indicate:

- Over half the group indicated the knowledge exchange instrument was used without change to predominantly take 'Action', and a quarter of the research participants suggested some *Modifications* need to be made to the tool.
- Bravo, Mike and Whiskey mainly *Used* the tool to 'Act', while Delta and Sierra used the knowledge exchange instrument predominantly to 'Think'.
- Lima was evenly split in *Using* the tool to both plan ('Think') and take action ('Act').

- None of the research participants said the tool was *Impractical* to help them to plan ('Think'), with only Delta, Mike and Whiskey suggesting they may *Not Use* the knowledge exchange instrument to take action ('Act').

The following quotes from the data collected during the focus group link directly to the analysis.

Category: Help to THINK/Practical (Used)

*'I picked up the guide (knowledge exchange instrument) and had a look at it and kind of thought, where did we go wrong, why did we only have partial success, what was that barrier? If it jumps out in front of me looking at the knowledge exchange and it was clear that these executives didn't have the relationships within that investment team, they needed to be meetings beforehand and support, almost like you're going in for a campaign. You need to know who's going to back you and I don't think that was done but that was just observing the guide (knowledge exchange instrument) and it kind of went, yeah, that is something that we just didn't do.'* (Sierra)

Category: Help to THINK/Modify (Changed)

*'They're all linked together and there should be one splattered sort of starred arrow thing in the middle, if you need arrows, because one is going to affect the other.'* (Mike)

*'Mine was more about communicating something or exchanging information or knowledge or receiving.'* (Delta)

Category: Help to ACT/Practical (Used)

*'I chose to implement this as a closed experiment. Only I knew about the experiment.'* (Mike)

Category: Help to ACT/Modify (Changed)

*'In all its (knowledge exchange instrument) forms you just use the number of different types of communication that you use in a single day with a different audience.'* (Bravo)

Category: Help to ACT/Impractical (Not Used)

*'I struggled with the term cycle, it's like a continuous improvement cycle.'* (Delta)

A spider diagram representing the data analysed for this question has been included in Appendix 4–3 for reference.

**Question 4:** *Did anybody actually change the knowledge exchange instrument?*

When I asked the research participants whether they changed the knowledge exchange instrument I was looking at identifying any adaptations they made to suit their specific environment. The data formed into four distinct categories, which did not refer to whether the knowledge exchange instrument was used to ‘Think’ or ‘Act’. The responses from the research participants were they did not change the tool (Category: Did not Change); they changed the tool (Category: Modified); they did not use the tool (Category: Did not Use), or they used the tool in their current project management practice (Category: Incorporated with Current Practice).

The data was analysed from the responses given by the research participants and indicate:

- When using the knowledge exchange instrument, the group suggested in over a quarter of the interactions where they used the tool, they either *Did Not Change it, Modified it, or Incorporated it into Current Practice*.
- Individual research participants did not show a dominant pattern in category responses.
- Delta and Whiskey said they *Modified* the knowledge exchange instrument in all the interactions where they used the tool, and Lima completely *Incorporated with Current Practice*.
- Sierra indicated a balance between *Modifying* the tool, and *Not Changing* it, and to a lesser degree, *Incorporating with Current Practice*.
- Only Mike suggested he *Did Not Use* the knowledge exchange instrument in half of his interactions, and in the other half he *Did Not Change* the tool.
- There were no responses from Bravo to this question.

The data collected for this question was minimal compared to previous questions, with the following quotes from the research participants indicating how they potentially changed the knowledge exchange instrument.

Category: Did Not Change

*‘I’d kind of prioritise them (the knowledge exchange instrument sections) as to what order I’d approach and then kind of slot it into my agenda.’ (Sierra)*

Category: Modified

*'I turned it into a simple list. It really was like a check list and I started with the organisation, because that was the biggest picture and then followed the cycle, because it was just a list. It just made it sit in my mind easier and seemed logical.'*  
(Delta)

*'I started to think about just a pyramid and within a pyramid I'd have - whether it'd be the particular areas that I wanted to focus on.'* (Sierra)

Category: Did Not Use

*'In my case it didn't feel like changing your model (knowledge exchange instrument), it felt like substituting my own.'* (Mike). In this case the research participant preferred to use the model he had developed after being exposed to the knowledge exchange instrument.

Category: Incorporated With Current Practice

*'I think I just used it and went, okay, these were the gaps that were missing for me and just add it to whatever I was preparing. I didn't think about changing the model.'*  
(Lima)

A spider diagram representing the data analysed for this question has been included in Appendix 4-4 for reference.

**Question 5:** *Did the knowledge exchange instrument change anybody's behaviour?*

Only a small number of responses were gathered to indicate if the research participants changed their, or others, behaviour as a result of using it. This may limit the insights in this question, however I have included what the data indicated in the categories of whether their behaviour *Changed* or *Did Not Change* when they were 'Thinking' about knowledge exchange, or taking 'Action'.

The data was analysed from the focus group meeting and indicated:

- The group was almost evenly split between how their behaviour *Changed*, either helping them to 'Think' or 'Act'.

- Less than a quarter of the responses suggested the tool *Did Not Change* their behaviour when taking 'Action', with no responses suggesting the tool helped them to 'Think'.
- Mike and Whiskey indicated the knowledge exchange instrument significantly *Changed* their behaviour while they were undertaking activities ('Act').
- Delta and Sierra indicated they *Changed* their behaviour when they were 'Thinking' as well as taking 'Action'.
- Bravo *Did Not Change* behaviour while the tool helped Lima to *Change* 'Thinking' about planning when it came to knowledge exchange, but this did not translate to 'Action'.

The responses to the question about whether the knowledge exchange instrument changed any of the research participants' behaviour solicited the following statements.

Category: Help to THINK/Changed

*'This ... is what I want to get out of it, but because I had to do this it made me think of it in a more structured way.'* (Lima)

*'Seize the opportunity so I can get out of it and modify both the communication before, during or after businesses, because you get those opportunities whether they're now or later. So there's always a strategic type of way that I can modify my behaviour.'* (Sierra)

Category: Help to ACT/Changed

*'What we're trying to do is as many different approaches that aren't conflicting, to encourage people to share knowledge, because there's an awful lot of it going to walk out of the door.'* (Whiskey)

Category: Help to ACT/Did Not Change

*'I looked at it but I just then went and ... then went and did my own thing and then recorded some of the events arising out of the communication.'* (Bravo)

A spider diagram representing the data analysed for this question has been included in Appendix 4–5 for reference.



### **Summary of Intervention Four Analysis: Focus Group**

When analysing the data according to the classifications of whether the research participants used the knowledge exchange instrument to 'Think' or 'Act', it was evident the data indicated they would be twice as likely to use the tool to plan their interactions as they would without the tool. In analysing these positive responses, the use of the knowledge exchange instrument to either 'Think' or 'Act' when exchanging knowledge, it was evident the research participants used this tool as a 'memory jogger' and also to suggest approaches they had not considered before an interaction. It was also evident the tool was not used during the exchange of knowledge; however in some cases it was used to review what had happened after the interaction. Analysis of the data demonstrated an almost even balance between helping the research participants to 'Think' and 'Act' when asked if there was anything negative about the knowledge exchange instrument. They indicated the tool did not need anything to be deleted, and may be slightly improved with some additional changes. The research participants suggested the knowledge exchange instrument was three times more likely to help them actually exchange knowledge using this different tool than without it. When using the tool it was indicated by the data to be more than twice as effective in a practical situation as it was, and occasionally could be modified. When I asked if the knowledge exchange instrument was likely to change the research participants' behaviour, the overwhelming response was it would while thinking about or planning the interaction rather than during the exchange of knowledge. The majority of research participants modified the knowledge exchange instrument, and incorporated it into their current practices. Only two research participants suggested they would not change the tool, although one said, in addition to incorporating it into their current practice, they also were highly likely to adapt the tool.

### **4.6.3 Research Participant Reflections**

The purpose of the reflective journals was to create a vehicle for the research participants to record how they exchanged knowledge in a structured format. The '... competency practitioners display in unique, uncertain, and conflicted situations in practice' (Schön 1987, p. 13) is referred to as *reflection-in-action*. To capture and encourage *reflection-in-action* I devised two reflective journals for the research participants. The first journal was designed to capture the way the research participants usually exchange knowledge and was completed by the research participants between Interventions one and three. The second journal was to capture what occurred when the research participants implemented the knowledge exchange

instrument and was completed between Interventions three and four. I have listed below the questions asked of the research participants in each reflective journal.

## **Reflective Journal One Analysis: Current Knowledge Exchange Practices**

The research participants were asked to complete a series of questions in a purpose designed reflective journal I gave them in intervention one after the interview had finished and for three months before the second intervention. The folder included five reflective sets, each made up of four questions which were to be completed over a month. The final task after completing each research set was for the research participants to review their entries so they could reflect on their knowledge exchange experiences. In this review the research participants were asked to include any common themes or recurring thoughts and actions.

The four questions the research participants were asked in the first reflective journal included:

1. *What have I learned today?*

Reflect on the main points and observations. What did I find most challenging and why?

2. *How did I create this new knowledge?*

Reflect on how I created this knowledge—was it an original idea, information provided from a work colleague or something I heard or read or observed?

3. *What will I do with this new knowledge?*

Reflect on how I will apply this new knowledge to my projects. How will I do this – note specific actions.

4. *What is the impact of this new knowledge?*

Reflect on the implications for me, my team/s and my organisation. What do I need to start doing, do more of, do less of, or stop doing?

The final reflection was aimed at eliciting the most important insights or learnings from a *personal* and *organisational* perspective. The research participants were advised an organisational perspectives may include:

- 'Frequency of use of the system and satisfaction with the information found in internal databases.

- Reports of higher sales or more satisfied customers as a result of sharing of knowledge and best practices.
- Cycle time to implement best practices. Do your approaches speed it up?
- The grassroots growth in virtual teams and networks 'popping up' all across the organization. The potential danger here is mistaking activity for results' (O'Dell & Jackson Grayson 1998, p. 171).

The first reflective journal was completed by four of the six research participants, and they were collected at the conclusion of the second intervention observation day. The research participants had been shown in the first intervention how to enter their reflections in the appropriate sheets in the reflective journal. In each of the knowledge exchange situations the research participants were asked to reflect on the five questions, thus creating a set of answers I would analyse to further understand how they exchanged knowledge exchange in a very personal medium.

Journal feedback was limited as they were only partially completed. Bravo completed only the first question for four reflective sets, except in one instance when Bravo reflected on what would be done with some new knowledge. Delta managed to enter three reflective sets, with some questions within those sets left unanswered. Lima entered 13 reflective sets, which was the most prolific, with some questions answered in more reflective detail than others. Mike entered five complete sets with the review question answered, and then four reflective sets, without a review. Sierra and Whiskey did not complete their reflective journals. A summary of the individual research participants' reflections on how they exchange knowledge follows.

#### **Research Participant: Bravo**

Bravo reflected across several projects in regard to the problems in managing reactive decisions predominantly triggered by people. Most of the issues were identified with suggested actions noted. There was minimal reflection by Bravo on what was learned during this process, with no comment on how Bravo created new knowledge. Bravo recognises he sometimes does not '... delegate down until I know the person better that I am delegating too'. There was also no comment on the impact made by Bravo with new knowledge.

#### **Research Participant: Delta**

Delta identified various learnings through reflecting on knowledge exchange interactions predominantly with managers. Intimate self-reflection was evident when suggesting '... if I am

not sharing my difficulties then I am not sharing my knowledge'. Delta included notes on difficult issues and noted actions to resolve these at a tactical level, while at the same time reflecting on the strategic impact across the organisation. Delta also identified areas for development stating 'I still have a lot to learn'.

Delta referred to gaining knowledge as opposed to creating knowledge through reflective listening. This approach was considered at an individual and an organisational level. Delta gave examples of where he added '... new knowledge to my existing knowledge, particularly projects within my program'. This new knowledge triggered a re-evaluation of the priorities and drivers within current programs. It was evident in one specific scenario new knowledge was required to address non-traditional contract arrangements.

Reflecting on what would be done with this new knowledge, Delta identified two key areas. One was to '... share more of my difficulties with my staff (and others) so they can benefit from my 'learning/growing' experiences'. Another was '... to be a better reflective listener' as Delta noted, reflection creates a source of learning. Delta suggested he would '... use this knowledge to critically review existing and new projects, specifically with a renewed focus on value for money'. Questions were also asked by Delta in regard to reviewing stakeholder input, the appropriate allocation of funds, and learning through storytelling.

Delta suggested this new knowledge could shape the structure of the organisation and its ability to create and develop ideas to meet market requirements. Delta suggested several times he needed to share this new knowledge '... with my team of project managers... [and] ... with my stakeholders' so they are able to focus on making value based decisions.

#### **Research Participant: Lima**

Lima clearly identified what was learnt by exchanging knowledge across a range of projects. These learnings included managing the politics and relationships across the organisation '... in an effort to clarify project scope' and the strategic value of the work. Identifying and allocating appropriately skilled resources with the support of senior management was, according to Lima, essential in managing his projects. Lima also reflected on '... the need to share project milestones with the project team and business stakeholders', and the necessity to communicate at an appropriate level with senior management. The learnings were identified through challenges noted in the reflective journal when unplanned interactions occurred and how '... to not damage a good relationship'.

Lima referred to additional new knowledge created through addressing issues across several projects. The issues were related to resourcing projects and several communication breakdowns which at times ‘... may have been intentional’. The creation of new knowledge occurred when Lima was managing unexpected situations. These included the requirement to be prepared for meetings with the project sponsor, identifying productivity gains based on assumptions, and managing expectations. Lima also encouraged feedback from the project team although ‘... they did not want to be seen to be complaining’.

Lima was clear on what to do with the new knowledge, with the focus on being able to ‘... provide the necessary facts and information to the relevant parties’. Reflecting on what to do with the knowledge, Lima instigated regular meetings ‘... to ensure information sharing and collaborative planning’ would occur across all projects. This appeared to be essential when engaging resources from across the organisation and through external vendors, and occurred formally in planned meetings and informally through chats.

The impact of the new knowledge was linked by Lima to ‘... the success or failure of the project’. Specifically, Lima referred to the impact of ‘... scope creep’, assumptions, and ‘... monitoring project progress to see if knowledge transfer is occurring’. Lima reflected on lessons learnt in regard to ‘... engaging the business users earlier, ‘... to be across all aspects of the project’, and escalating issues if necessary. At the same time Lima noted team members and stakeholders need to be encouraged to take responsibility for their role on the project.

#### **Research Participant: Mike**

Mike reflected on how he exchanged knowledge across several projects using the ‘power of questions’ and ‘a supportive conversation’. Reflecting on how others view business requirements was evident in Mike's notes on several meetings to dismiss a team member. The learnings through this event and other interactions ‘... reminded [Mike] to a) be patient, b) listen, and c) make things as simple as possible to push an initiative forward’.

The creation of new knowledge was noted by Mike through questioning and listening, in particular to identify ‘... what was working and what was not working’. This approach appeared to mature through the reflective journal entries, culminating in the final statement where Mike said ‘... I will be open to sharing and listening without judgement’. Mike noted this new knowledge will be used to ‘... reflect on how I might expand or enhance ... my business more efficiently and cheaply and in a more fun way!’ In addition, Mike suggested reflecting ‘... is a

great concept which holds a different dimension of thinking ... [and] ... capitalises on more options’.

The impact of this new knowledge was captured by Mike again in the form of questions, such as ‘... what do I need to start doing, do more of, do less of, or stop doing’. Mike also reflects on the creation of a ‘happy job life, efficiency and greater synergy with clients ... and much less stress in leading the team to convert and promote a richer approach’ to delivering projects.

Mike was the only research participant who included a final review of all of his reflective journal entries that summarised his learnings. These learnings included listening moments with people he respects, and reflects on Mike’s creative ability to devise approaches when working with others to achieve a collaborative outcome.

### **Summary of Reflective Journal One Analysis: Current Knowledge Exchange Practices**

When reflecting on exchanging knowledge, the four research participants all approached the task by either reflecting on the tasks or the people. Some reflections included both these focus points, with self-managed, self-reflection unusual, as often the research participants were reflecting on ways to solve immediate project issues through their exchanges.

There were some insightful reflections from Bravo which were focused on responding to people, although there was little evidence the exchange of knowledge generated new insights. Delta described some of the most insightful reflections in particular when he was reflecting on exchanges with managers. Many of Delta’s reflections revolved around understanding how to transition his tactical knowledge to a strategic level, and at the same time resolve unique situations. Delta saw the value in reflecting on a regular basis as it focused his attention on how to share their knowledge, and used the journal to gain a deeper understanding of Delta’s own behaviours. It was clear through the entries Lima made in his reflective journal he saw this vehicle as an effective tool to reflect on what was occurring across the organisation, and the impact organisational politics were having on his projects. Lima understood how he needed to apply the knowledge gained through various exchanges, in particular with senior management. Engaging with external parties and challenging internal resources saw Lima develop solutions through reflections on the impact of the success or failure of the projects he was working on. The majority of Lima’s reflections were projected externally to improving outcomes for the organisation, the project or the project team, rather than on personal development. In reflecting on Mike’s work with clients he understood the value of asking oneself questions to identify areas needing attention, as well as creating ‘listening opportunities’. Mike's reflections

centred on balancing decisions, looking for efficiencies, and reducing stress. Unlike Lima and Delta, the focus of Mike's reflections was constantly to do with relationships and communications and this impacted on people's reactions in knowledge exchange situations.

## **Reflective Journal Two Analysis: Implementation of the Knowledge Exchange Instrument**

The second reflective journal the research participants were asked to complete was designed to capture their reflections on the implementation of the knowledge exchange instrument. The research participants were asked to make regular entries in their reflective journal between interventions three and four, after they had completed the first reflective journal. The research participants were asked to complete five reflective sets of the questions in the reflective journal and then to reflect on any common threads, themes or recurring thoughts and actions. They were also asked to reflect on the most important insights or learning from a personal and organisational perspective.

The five questions the research participants were asked to address include:

1. *When did I refer to the knowledge exchange instrument?*

Reflect on the reasons why I did or did not refer to the knowledge exchange instrument. What did I find most challenging and why?

2. *When did I use the knowledge exchange instrument?*

Reflect on how I used the knowledge exchange instrument. Did I use the tool in its original state or did I modify it?

3. *How did I modify the knowledge exchange instrument?*

Reflect on how I changed the knowledge exchange instrument to suit my projects – note specific changes and why.

4. *What is the impact of using the knowledge exchange instrument?*

Reflect on the implications for me, my team/s and my organisation of using the knowledge exchange instrument. Did it help me in any way? Will I continue to use the original knowledge exchange instrument or the new version I created?

5. *Review—What Have I Learned?*

After completing five sets of the four questions in your reflective journal, reflect on what you have already written since your last Review and identify any common threads, themes or recurring thoughts and actions.

The second reflective journal was completed by the same four research participants who completed the first reflective journal in one month. The reflective journals were collected at the conclusion of the focus group meeting, with the exception of Whiskey who gave me their journals after a later meeting. The research participants had been shown in a briefing meeting, which is referred to as intervention three, how to enter their reflections in the appropriate sheets in the reflective journals. In each of their chosen knowledge exchange situations the research participants were asked to reflect on the five questions, creating a set of answers I would analyse to determine how the knowledge exchange instrument was used. Bravo and Mike entered the required number of reflection sets with Lima entering four reflection sets, and Delta managed to enter three reflection sets. Sierra and Whiskey did not complete their reflective journals as Sierra moved to a different state and lost the journal and Whiskey was on leave for three months. A summary of the individual research participants' reflections on how they used their knowledge exchange instrument follows.

#### **Research Participant: Bravo**

Bravo described how the knowledge exchange instrument was referred to consistently across five different meetings where Bravo described the background to the meetings according to several of the five sections depicted in the knowledge exchange instrument diagram. In all descriptions of the interactions, Bravo referred to the classifications: 'Individuals'; 'Relationships'; and 'Maps'. In three of the projects he was working on, Bravo made reference to the 'Nature of the Project', and in two of the meetings, the impact of the 'Organisation' on these projects. The exchanges took place in two internal project meetings, one internal training meeting, one external client meeting, and one joint venture project meeting. When Bravo reflected on how the knowledge exchange instrument was used in all exchanges Bravo suggested it was '... more subconsciously than consciously... not used in a formal sense... but subjectively'. The knowledge exchange instrument was not *modified* as Bravo '... did not change it really... [as] ... I just followed instinct'. Bravo suggested the *impact* of the knowledge exchange instrument may not have been obvious as '... once again I follow instinct ... [and] ... may have informally followed it '.

Bravo was the only research participant able to articulate his reflections on the common threads throughout the exercise. The following direct quotes were listed in Bravo's reflective journal as reminders of what had been captured during Bravo's reflections:

- '*Prepare for the communication/meeting/knowledge exchange before going into it (before starting)*'.



- *'Preparation especially important with knowledge exchange with external parties – not so critical with internal parties'.*
- *'Research the characters beforehand if possible and change if events change'.*
- *'Most importantly be ready to adapt as the knowledge exchange progresses'.*
- *'Know your subject matter'.*
- *'Knowing how mature the individual is important, but knowing the amount of trust between you and the other is critical'.*
- *'Tools—as appropriate. General comments: avoid sophisticated fancy stuff as the audience can perceive this as a disguise—covering for poor content'.*
- *'Knowledge exchange is best done face-to-face in our business (not virtual)'.*

### **Research Participant: Delta**

Delta *referred* to the knowledge exchange instrument for three reflective sets which included one external and two internal knowledge exchange situations. In referring to the knowledge exchange instrument Delta found '... it was a challenge because it was new and not instinctive, but it is reasonably sensible/logical/intuitive'.

When describing how the knowledge exchange instrument was *used* throughout the interactions, Delta referred specifically to the classifications in the diagram. Each of the three knowledge exchange situations was described in terms of 'Organisation'; 'Individuals'; 'Relationships'; 'Tools'; and the 'Nature of the Project'. Delta found the knowledge exchange instrument was used to help prepare for meetings although it was '... not a lot different to what I would have done anyway'. Delta did not *modify* the knowledge exchange instrument in any of the three situations.

The *impact* of the knowledge exchange instrument was evident when Delta reflected on how he was '... a little better prepared, though I would have done a similar preparation without the knowledge exchange instrument, but perhaps not as focused on particular aspects'. In the last set Delta reflected on three learnings which focused specifically on the project not the knowledge exchange instrument.

### **Research Participant: Lima**

Lima made four entries in the reflective journal summarising whether the knowledge exchange instrument had been *referred* to during the week, with the final week showing multiple uses. All knowledge exchange situations described had related to internal meetings only, with one

week where the knowledge exchange instrument was not referred to at all. Lima ‘... noted that I tend not to refer to [the] guide (knowledge exchange instrument) if I don't think it is a potentially difficult situation to handle’. However, in the last entry Lima referred to the knowledge exchange instrument to ‘... gain agreement/commitment on resourcing... [and] ... manage the relationship between the other two individuals and to have clarity of facts being discussed/agreed’. One direct criticism about the knowledge exchange instrument by Lima was ‘... it does not really address the 'how' to tackle the knowledge exchange situation’.

Lima *used* the knowledge exchange instrument to focus on the exchange outcome and ‘... used trigger questions to help prepare ‘... for various meetings and also as a ‘memory jogger’. Lima mentioned specific sections such as the 'Nature of the Relationship', in particular 'Power' and 'Trust', and the 'Nature of Individual' and 'Personal Traits'.

The knowledge exchange instrument was not *modified* by Lima, but used to ‘... anticipate the reaction of committee members’ and to reflect before meetings on what needed to be achieved and after meetings if this was actually achieved ‘... and if not, what do I need to do about it’.

The *impact* of the knowledge exchange instrument for Lima was described as contributing to meeting preparation, and the ‘... thinking process to work out an approach to the knowledge exchange situation’. Lima would prefer to use a modified version of the knowledge exchange instrument which included ‘... some tips on the 'how' for various scenarios’.

### **Research Participant: Mike**

Mike completed five reflective sets in the reflective journal in consecutive weeks. The knowledge exchange instrument was *referred* to consistently throughout the five weeks for internal coaching sessions and discussions with senior clients. The Instrument assisted in ‘... formatting an agenda for the session, as well as a common construct for examining the project we are discussing’. Even though Mike ‘... referred to the guide for my presentation as a means of concisely packaging the important elements of the project being reviewed’ the knowledge exchange instrument was ‘... viewed as too simplistic’ when exchanging knowledge with senior people.

The *use* of the knowledge exchange instrument moved progressively from the first week where Mike reflected on the ‘... easily conveyed structure with which I could review the project direction’, to week two where Mike used the knowledge exchange instrument ‘... to ensure I

captured all aspects' and in week three '... to establish the agenda and track the conversation'. However in weeks four and five Mike reflected on the need to modify the knowledge exchange instrument to '... focus appropriately on the issues at hand'.

Mike *modified* the knowledge exchange instrument in week two as he 'sensed' the client needed information from a different perspective, and in week four restructured the knowledge exchange instrument '... to present a primary focus on the business benefits... and referred to issues and concerns using the elements of the guide (knowledge exchange instrument)'. Conversely in weeks one and three the knowledge exchange instrument was not modified, and in week five, Mike reflected on using the Instrument to '... structure thought perception around the knowledge exchange instrument construct'.

The *impact* of the knowledge exchange instrument for Mike was to create '... a high level checklist to ensure all aspects of the project were covered' and found the '... structure is easy to grasp, remember and apply'. However, with a more sophisticated or senior audience Mike saw the need to modify the knowledge exchange instrument '... to convey the project issues and concerns in priority order'.

### **Summary of Reflective Journal Two Analysis: Implementation of the Knowledge Exchange Instrument**

The questions the research participants were asked to reflect on in the second reflective journal were focused specifically on their implementation of the knowledge exchange instrument, and any resultant changes to their practice of exchanging knowledge. I did not compare the data between the first and second reflective journals as they were designed for discrete data output, and were independent of each other. When implementing the knowledge exchange instrument Bravo, Delta, Lima, and Mike consistently entered their reflections in this second journal. As these research participants were directly focused on capturing how they implemented the tool, most of their reflections centred on the tactical approaches used, with limited reflections on their personal observations. Bravo was able to capture several key points when working with the knowledge exchange instrument and, in particular, referred to specific contexts in which the tool was used. In using the knowledge exchange instrument Bravo followed his instincts and captured several personal reflections as a result of using this tool. These reflections focused on the value of preparation, understanding key stakeholders, the need for trust for the exchange of knowledge. Delta found the knowledge exchange instrument gave him a focused tool to assist in the preparation for

several interactions. Delta described the specific classifications for each interaction when reflecting on particular areas requiring a tactical focus.

Delta was able to use the tool as it afforded a ‘... reasonably sensible/logical/intuitive’ approach to managing the exchange of knowledge. The use of the knowledge exchange instrument by Lima was referred to on a weekly basis in the reflective journal. Lima was able to capture both personal and task oriented reflections generating a broader perspective. The tool was also constructively criticised by Lima who preferred additional instructions with more detail on how to address specific knowledge exchange situations. Lima found the knowledge exchange instrument contributed to being better prepared, particularly in difficult interactions. Mike understood the value of having a structured approach to exchanging knowledge and therefore captured reflections in a systematic manner. The knowledge exchange instrument was found to work particularly well in establishing agendas and comprehensive checklists to ensure all aspects during an interaction were captured. Mike was also acutely aware the tool was too simplistic to use with a sophisticated group of stakeholders, so modified the classifications to suit the audience.

#### **4.6.4 External Reference Group Reflections**

The external reference group was invited to join the research with the remit to contribute to my planned Interventions through their various industry and academic perspectives. The group was established to create a way to reflect on my research at various stages throughout the interventions. The group was also expected to contribute to the research through their insights into the preparations and outcomes of the interventions. The members of the group include a retired academic (Alpha); an active academic and project manager who is the past president of an Australian project management association (Papa-Mike); a founder of a large international project management organisation who is also an adjunct professor (India), and a project manager who is the previous president of a local Australian chapter of an international project management association (Papa-Alpha). More detail on the external reference group’s background is included in ‘Chapter 3: Research Methodology and Methods–Section 3.8.1’.

I gave the external reference group a detailed research outline, including the objectives and aims of the research and what my expected contributions could be to policy, practice and theory. The group agreed on meeting protocols and discussing research progress and plans at specific stages of the research, basing the discussion on an agenda I sent with supporting documents prior to the meetings. Meeting notes were recorded and transcribed for reflection.

I also established my own protocols for capturing the discussions, both my notes taken during the meetings and the digital recordings which were transcribed within 24 hours of each meeting.

The context of each of the three meetings with the external reference group is followed by my reflections, as presented in previous reflective sections in this chapter.

## **First Meeting: Intervention One Review and Intervention Two**

### **Preparation**

#### External Reference Group Context:

The first one hour teleconference with the external reference group was designed to review the outcomes from the first intervention, what I had planned for the second intervention, and the purpose of the research participants capturing their reflections of how they exchanged knowledge in a journal. The documents I emailed to the external reference group included the letter of consent to participate in the research, a copy of the first intervention interview questions, an overview of the data collected from the meetings with each research participant, removing any identifying information, and the instructions on how to complete the first reflective journal. The planning required to get all four members of the group aligned on the same day and time, with one member based in Asia, was not as difficult as I had anticipated as they were all eager to participate in the research.

#### Researcher Reflections:

Taking time at the beginning of the teleconference meeting to outline my expectations created a structure for the external reference group members as to their role in the research. After introducing the research topic and outlining the research methodology and the role of the external reference group, I then supplied an overview of the first intervention's outcomes, the plans for the second intervention and what I expected from the research participants in regard to capturing how they exchanged knowledge in their reflective journals.

I had made some assumptions I would only be discussing the research project in the group meetings; however I learned the members of the group wanted to share their experiences, which took more time than I had anticipated. There was some discussion about the similarities between reflecting on your own actions and working with a mentor, using the example India gave about how his organisation has developed on-the-job mentoring, as well as weekly

project post-mortems to share knowledge. I reflected on how several of the organisations where the research participants worked were also implementing this approach due to a significant number of retirements expected in the next five to ten years.

I learned I needed to clearly describe the background to some of my decisions in the approach I had adopted for the research, such as balance in the selection of the group and the limited number of the research participants. This was questioned by several of the group members which led to a discussion on the lack of experienced women in project management, and the impact of early management researchers, such as Kotter (1999a, 1999b), and Mintzberg (1980a), on how I was able to justify involving a small number of research participants. The discussion also moved into confirming the role of the research participants, and whether I had established a controlled approach when they should, according to action research theory, be more involved in the process. I stated this had been included in interventions two and four when the research participants would be working on the design and implementation of a tool to accelerate knowledge exchange.

The support I received from Alpha generated insights for the other members who had less understanding of the academic rigour required in PhD research and the necessarily narrow focus of the topic. However, they all agreed the research I was conducting would yield a valuable contribution to the project management discipline.

## **Second Meeting: Intervention Two Review and Instrument Preparation**

### External Reference Group Context:

The second meeting with the external reference group was scheduled to discuss the outcome of the second intervention, and the early plans for a tool to be later known as the knowledge exchange instrument, to assist the research participants exchange knowledge. I gave an update on what had occurred since the last meeting, using the summary notes I had emailed to the external reference group beforehand. This update included the departure of two of the eight research participants.

### Researcher Reflections:

As I had a deeper understanding of the research approach, I had again assumed the members would accept my explanations of the decisions I had made since the last meeting. This was evident when I was questioned by one of the members who suggested I needed to increase the number of research participants to compensate for the two who had left the study. I had

already discussed this potential issue with my academic supervisor who suggested introducing new people at this stage would disrupt the research as two of the four interventions had been completed.

I had outlined the expectations of the second meeting, being a review of the raw data collected from the observations and discussed how I was developing a knowledge exchange instrument. However, one of the members expected to be given the data analysis and outcomes. This understanding was not shared by the other three members, and unfortunately the member who was expecting more from this meeting disengaged from the discussion when it was apparent this information was not available. This inconsistency in expectations was concerning to me so I took extra precautions to ensure the outcomes for the next meeting were more clearly articulated.

There was discussion regarding the definition of knowledge exchange and a suggestion by the members of the group to ask the research participants what their understanding of knowledge exchange was and to identify any differences to the definition I had provided. This highlighted for me I needed to be alert to the different perspectives of others participating in the research.

The narrow focus of my research was questioned, in particular the focus on the Australian context when the members could see the application being relevant worldwide. I reminded the members one of the outcomes of my research would be a discussion on the replication of the research across different countries, which alerted me to ensure this focus was clearly articulated in the thesis.

### **Third Meeting: Instrument Review and Intervention Three and Four Preparation**

#### External Reference Group Context:

The third meeting with the external reference group was scheduled to discuss the tool I had developed and the approach to be used for the third and fourth interventions. A draft of the tool, and the additional reflective journal instructions had been emailed prior to the meeting to all external reference group members. I gave an update on the work I had been doing in analysing the data collected from the first two interventions and how I had developed the tool with input from the research participants. I was also keen to review the approach I had developed for the focus group meeting as this was to be the final intervention and contact point with the research participants.

### Researcher Reflections:

The external reference group members agreed the knowledge exchange instrument I had developed was appropriate for the research participants to be reminded of the covert and overt approaches they could adopt to exchanging knowledge before, during and possibly after, an interaction. The additional and second reflective journal for the research participants to capture how the knowledge exchange instrument influenced their practice was seen by the members as adding a valuable and structured approach. This positive response to the two devices confirmed I was using an appropriate method to capture how knowledge could be exchanged in a consistent manner.

When discussing the approach I developed for the focus group meeting, two of the external reference group members expressed interest in attending, which I considered would add value to the discussion for both the research participants and myself. This created an opportunity for me to reduce the boundaries I had created between the external reference group and the research participants.

I had not anticipated a review of whether the original PhD questions were being addressed, as the external reference group members had indicated they agreed with the focus in the first meeting. However, this review created an opportunity to discuss my initial broader base which included understanding the impact of exchanging knowledge on the values, benefits, outcomes and possible drivers of an organisation. We all agreed these broader lines of enquiry were a distraction from the focus for this research, and could be addressed in future research. The discussion generated another opportunity for me to modify my approach to assume acceptance and understanding without validation.

### **Summary of External Reference Group Meetings and Reflections**

The establishment of an external reference group contributed to the advancement of my research through focused and impromptu discussions with those considered as insightful leaders in the project management discipline. The first external reference group meeting was an opportunity for me, in the first action research cycle, to examine the research situation. The second and third external reference group meetings assisted me in the second action research cycle when I was implementing a change to the approaches used by the research participants to exchange knowledge.



The first external reference group meeting established the members' understanding of what was required of them and to understand each other's backgrounds at a deeper level. I understood from the discussion in this first meeting the members were keenly aware of the contribution I would be making to the project management discipline, and the research I was conducting may help them individually. As I had been spending most of my time working on the research approach in virtual isolation, interacting with these experienced members gave me insights from some very different perspectives. Through the eyes of the members I was able to reflect on my research, and identify areas needing additional explanation and refinement by changing specific approaches, or reconfirming the approach I believed was appropriate.

In reflecting on the discussion in the second external reference group meeting I noted a common thread in needing to be ever vigilant as to the perspectives of other people involved in my research. I can also see a growing level of maturity in my defence of particular decisions, such as describing why it was important for the integrity of the data already collected not to include additional research participants to replace those who had left the study. Yet I continued to see the value of engaging with the members, in particular when they ask what might appear to be unassuming questions to elicit a justification for the approaches I developed.

The third and last meeting with the external reference group members confirmed the approach I designed to implement and evaluate a change in the research participant's environment. The tool I developed using input from the research participants was seen by the members as an appropriate and insightful way to structure an approach to exchange knowledge. The meetings were an opportunity for me to review what the research was aiming to identify, and time for me to reflect and revise the approach I had developed to answer the research questions.

#### ***4.7 Ethics***

Throughout the process of collecting and analysing the data I adhered to the Australian Code for the Responsible Conduct of Research (Australian Government 2007, p. 9), which underpins the University of Technology, Sydney, (UTS) guidelines for an ethical approach to human research. The development of a trusting relationship with each research participant reassured them if any issues arose they would be managed through a negotiated agreement. I also regularly reminded the research participants that their input would remain confidential. The

major ethical issues identified in 'Chapter 3: Research Methodology and Methods' are outlined in the following section and include how I selected the research participants, how I addressed any bias, and the confidentiality of the research documentation. As I collected and analysed the data none of the identified ethical issues occurred, and no unforeseen ethical issues arose.

To select project managers without personal bias, I developed detailed criteria to ensure a purposeful group was invited to participate in the research. As a result of this approach, eight research participants agreed to be involved, with support of their organisations. Interaction with the invited project managers to ensure ongoing participation and integrity of their contribution was assured through written and verbal means. Initially a letter of consent was signed by the research participant to ensure expectations were clear, and confidentiality was overtly addressed. Throughout the collection of data a regular schedule of phone calls and meetings provided each research participant with the opportunity to develop a level of trust with me.

I was concerned about bias so I put in place several mechanisms to manage any perceived or actual bias might negatively impact the research project. The first approach I developed was to ensure I consistently managed the collection and analysis of all data according to a standard framework. Second, I compared the literature to guide my reflective perspectives, and third, through the formation of an external reference group which generated a purposeful framework for reflection. Through this approach I deliberately minimised any unintended bias. I also was clear not to induce, lead or influence the research participants through explicit written commentary in the letter of consent, and by acting appropriately at all times, which is evident in the recordings of each interaction.

The privacy and confidentiality of all the data collected, and specifically the reflective journals, was essential to maintain the continued commitment of the research participants throughout the research. I ensured the identities of all parties involved in the research were confidential and their data was renamed with pseudonyms. The secure storage of all documentation was managed according to the Australian Code for the Responsible Conduct of Research.

## ***4.8 Summary***

Data was collected through three action research cycles where the existing situation was examined, and a change was implemented and then evaluated. The data originated from interviewing and observing six research participants, and their work colleagues, from both public and private sector organisations in Australia. I also collected data from the two

reflective journals completed by the research participants at significant points in the research cycles. The input from an external reference group gave further insights through my reflections on the approach I had developed to collect and analyse data. The final meeting with research participants, a focus group meeting, generated additional insights to complete the research.

The data was generated from four interventions which correlated to the three action research cycles. I examined the existing situation in the first intervention which included interviews with each research participant, and instruction on how to complete a reflective journal capturing how they exchanged knowledge. Intervention two generated data from interviewing work colleagues and observing the research participants as they went about their usual business. I initiated a change to the research participants' situation in the third intervention by introducing a knowledge exchange instrument as well as a second reflective journal to capture this change. The final action research cycle involved evaluating the tool in a focus group meeting, which constituted the fourth intervention. Guidance was also sought from an external reference group to validate my approach between interventions one and two, and twice between interventions two and three.

The data was then analysed using several grounded theory techniques adapted to an action research context to answer the two part question of how project managers acquire and then exchange knowledge. The first part of the analysis discovered the research participants acquired their knowledge through practical experience, and this experience had been gained informally or accidentally. The majority of the research participants indicated their skills were further developed in the workplace not in formal institutions, where some had gained foundational project management skills. This was confirmed when the research participants suggested the industry associations generated little or no value to the development of their project management skills. Part two of the analysis involved several perspectives to compare the data on how the research participants exchanged knowledge so I could generate a deeper understanding and validate the results. The research participants' perspective on how they exchanged knowledge suggested their preferred way was through a prevailing formal and impersonal approach. This perspective was reiterated through my *in situ* observations, and from the interviews with work colleagues.

There were three unexpected outcomes from interviewing the work colleagues. The first was the only alignment between a research participant and a work colleague was for Mike. The second was no work colleagues matched my observations, which were predominantly

'Impersonal and Formal'. The third was all work colleagues said their research participant exchanged knowledge in the same 'Impersonal and Informal' manner.

The use of the knowledge exchange instrument encouraged the research participants to think more deeply and take action prior to a situation where knowledge could be exchanged. It was discovered the tool was not used while the research participants exchanged knowledge; however in some cases it was used to review their interactions to identify further improvements. The research participants indicated they were able to more effectively exchange knowledge using the tool, and in most cases made modifications to suit their specific environment.

To generate further insights into the analysis of the interviews, observations, and focus group meeting, I also analysed the two reflective journals of the research participants, taken from separate times in the research, and also included my reflections on the input from the external reference group. The first reflective journal the research participants were asked to complete focused on how they saw themselves exchanging knowledge. In the majority of entries in the journals, the reflections focused on solving immediate project issues through the tasks or the people involved with some commentary on how they could improve their ability to exchange knowledge. When reflecting on implementing the knowledge exchange instrument in the second reflective journal, the research participants captured some personal reflections on the benefits and issues with using the tool. However, in all journals the focus was predominantly on a systematic application of the tool using a checklist approach to ensure most of the criteria had been addressed.

The external reference group contributed different perspectives of how I was approaching the research, and highlighted a predisposition I had in assuming those involved in the research understood as much as I did. The meetings elicited changes in my approach, in particular being more explanatory when briefing the research participants on what my expectations were of their involvement. These valuable insights assisted in developing a robust approach to address the research questions.

When gathering and analysing the data I was acutely aware of adhering to the Australian Code for the Responsible Conduct of Research, and I ensured the research participants understood their contributions and identity would remain confidential. The potential for bias in the selection of the research participants was managed by introducing a detailed criterion for selection, and in the collection and analysis of data through the explicit use of a detailed

framework. This also ensured the research participants' expectations were managed, and also those of the external reference group.

The analysis of the data leads to the fourth step in the process of examining and extending relevant theories. This is achieved through identifying the emergent elements, integrating these with the empirical research to then be able to describe an abstract phenomenon. This process will be further described in 'Chapter 5: Discussion'.

## 4.9 Appendices

The following table includes a description of the protocol used to delineate the headings for the appendices so they succinctly align to specific sections of the data analysed.

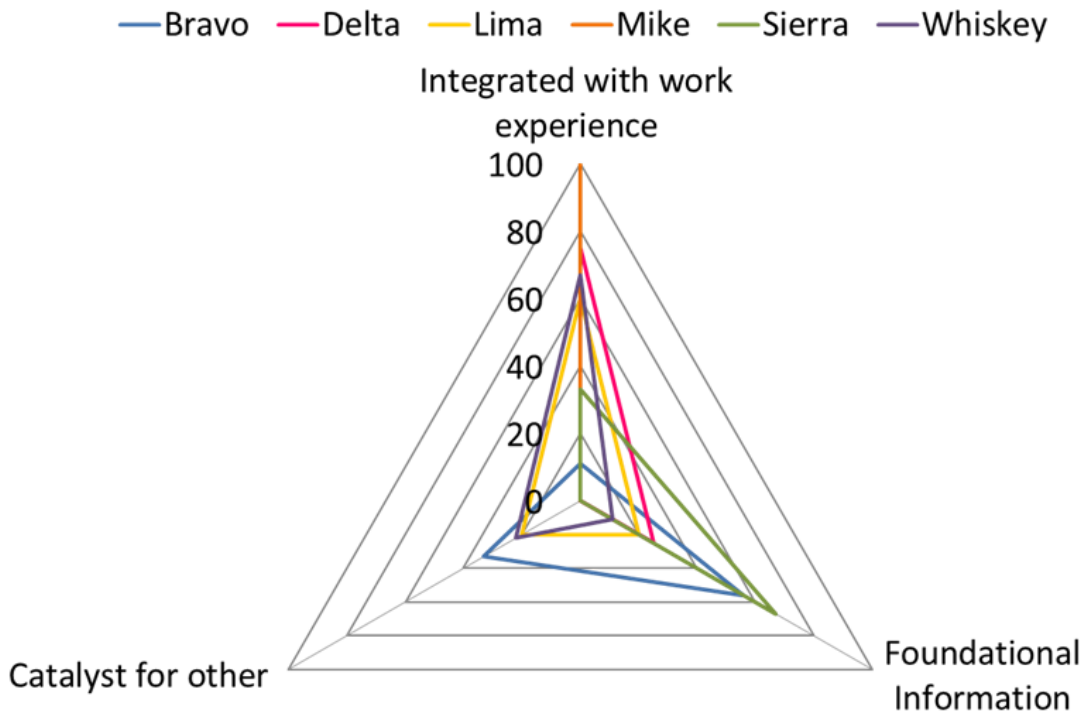
Appendix Heading	Description
Appendix 1–2	Intervention <b>1</b> , Research participant Interview Question <b>2</b>
Appendix 1–3	Intervention <b>1</b> , Research participant Interview Question <b>3</b>
Appendix 1–4	Intervention <b>1</b> , Research participant Interview Question <b>4</b>
Appendix 1–6	Intervention <b>1</b> , Research participant Interview Question <b>6</b>
Appendix 2–P	Intervention <b>2</b> , <i>in situ</i> Observations of Interactions with <i>Peers</i>
Appendix 2–P/C	Intervention <b>2</b> , <i>in situ</i> Observations of Interactions with <i>Peers</i> , according to the Classification of ‘Planned’ or ‘Impromptu’ interactions
Appendix 2–A	Intervention <b>2</b> , <i>in situ</i> Observations of Interactions with people <i>Above</i> the research participants level of responsibility
Appendix 2–A/C	Intervention <b>2</b> , <i>in situ</i> Observations of Interactions with people <i>Above</i> , according to the Classification of ‘Planned’ or ‘Impromptu’ interactions
Appendix 2–B	Intervention <b>2</b> , <i>in situ</i> Observations of Interactions with people <i>Below</i> the research participants level of responsibility
Appendix 2–B/C	Intervention <b>2</b> , <i>in situ</i> Observations of Interactions with people <i>Below</i> , according to the Classification of ‘Planned’ or ‘Impromptu’ interactions
Appendix 2–M	Intervention <b>2</b> , <i>in situ</i> Observations of Interactions with people who have a <i>Mixed</i> level of responsibility
Appendix 2–M/C	Intervention <b>2</b> , <i>in situ</i> Observations of Interactions with <i>Mixed</i> levels of people, according to the Classification of ‘Planned’ or ‘Impromptu’ interactions
Appendix 2–1	Intervention <b>2</b> , Work Colleague Interview Question <b>1</b>
Appendix 2–2	Intervention <b>2</b> , Work Colleague Interview Question <b>2</b>
Appendix 2–4	Intervention <b>2</b> , Work Colleague Interview Question <b>4</b>

<b>Appendix Heading</b>	<b>Description</b>
Appendix 2–5	Intervention <b>2</b> , Work Colleague Interview Question <b>5</b>
Appendix 4–B/SDS	Cross Comparison of what <b>Bravo Said, Did</b> , and what the Work Colleague <b>Said</b> about how Bravo exchanges knowledge.
Appendix 4–D/SDS	Cross Comparison of what <b>Delta Said, Did</b> , and what the Work Colleague <b>Said</b> about how Delta exchanges knowledge.
Appendix 4–L/SDS	Cross Comparison of what <b>Lima Said, Did</b> , and what the Work Colleague <b>Said</b> about how Lima exchanges knowledge.
Appendix 4–M/SDS	Cross Comparison of what <b>Mike Said, Did</b> , and what the Work Colleague <b>Said</b> about how Mike exchanges knowledge.
Appendix 4–S/SDS	Cross Comparison of what <b>Sierra Said, Did</b> , and what the Work Colleague <b>Said</b> about how Sierra exchanges knowledge
Appendix 4–W/SDS	Cross Comparison of what <b>Whiskey Said, Did</b> , and what the Work Colleague <b>Said</b> about how Whiskey exchanges knowledge
Appendix 4–1	Intervention <b>4</b> , Focus Group Meeting Question <b>1</b>
Appendix 4–2	Intervention <b>4</b> , Focus Group Meeting Question <b>2</b>
Appendix 4–3	Intervention <b>4</b> , Focus Group Meeting Question <b>3</b>
Appendix 4–4	Intervention <b>4</b> , Focus Group Meeting Question <b>4</b>
Appendix 4–5	Intervention <b>4</b> , Focus Group Meeting Question <b>5</b>
Appendix 1–DAQ	Intervention <b>1</b> , <b>Data Analysis Quotes</b> , by Category, by research participant
Appendix 4–DAQ	Intervention <b>4</b> , <b>Data Analysis Quotes</b> by Category, by research participant

## Appendix 1-2

**Intervention 1–Question 2:** *Education—what significance did Formal project management training have on your development as a project manager?*

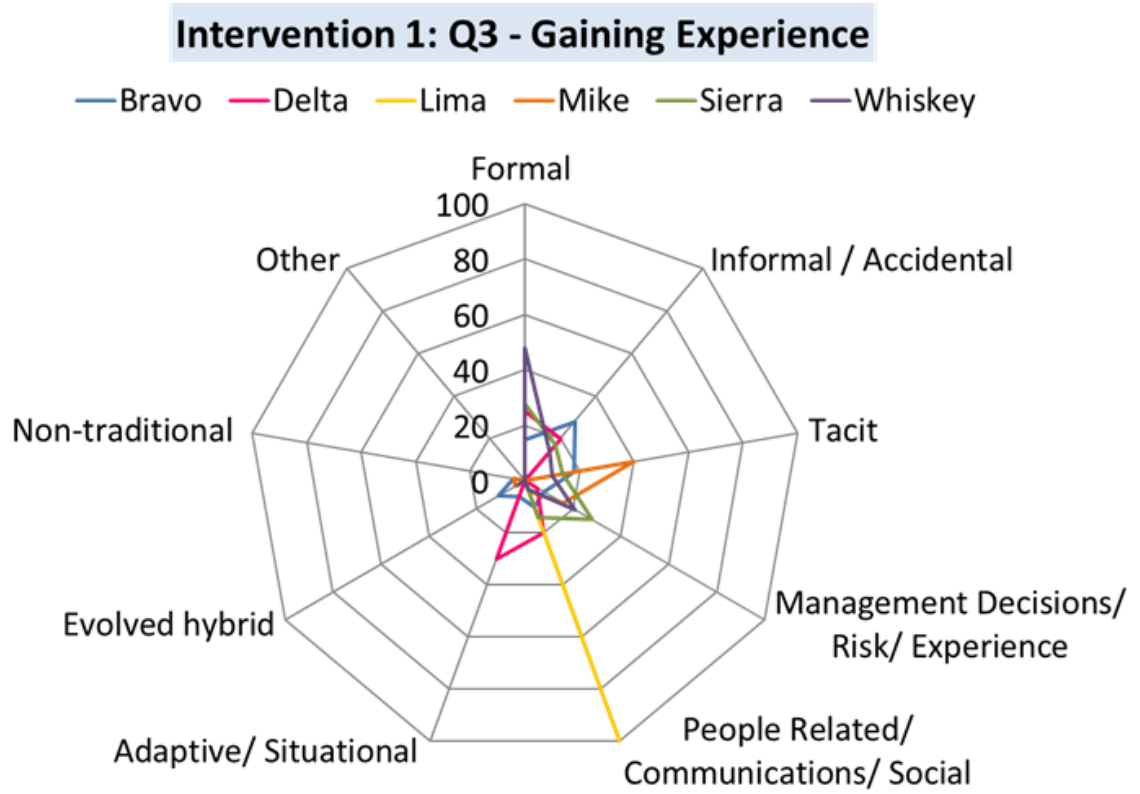
### Intervention 1: Q2 - Formal PM Training





## Appendix 1-3

**Intervention 1–Question 3:** *Experience—how do you gain your project management experience?*

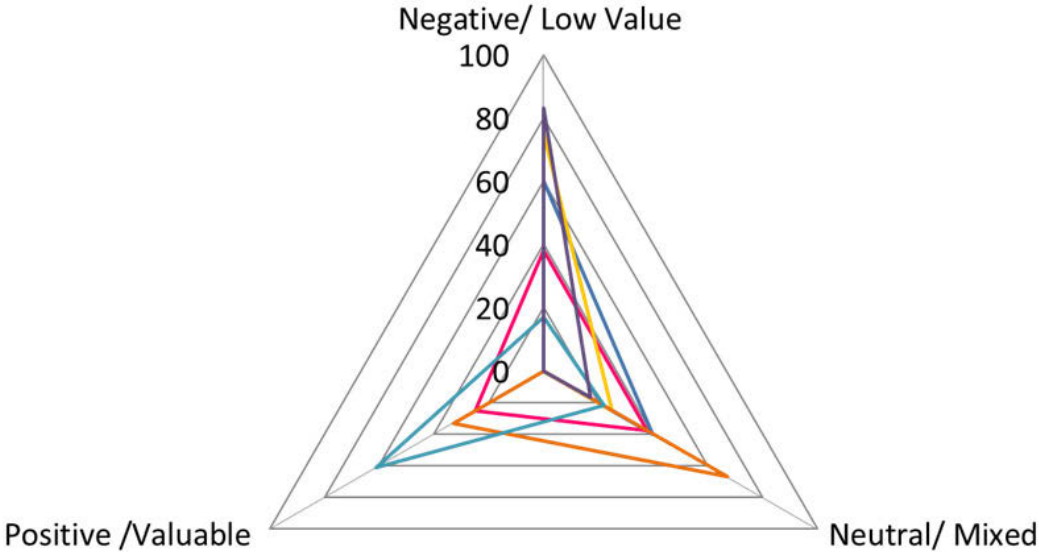


**Appendix 1-4**

**Intervention 1–Question 4:** *What is the value of project management associations in your Personal development?*

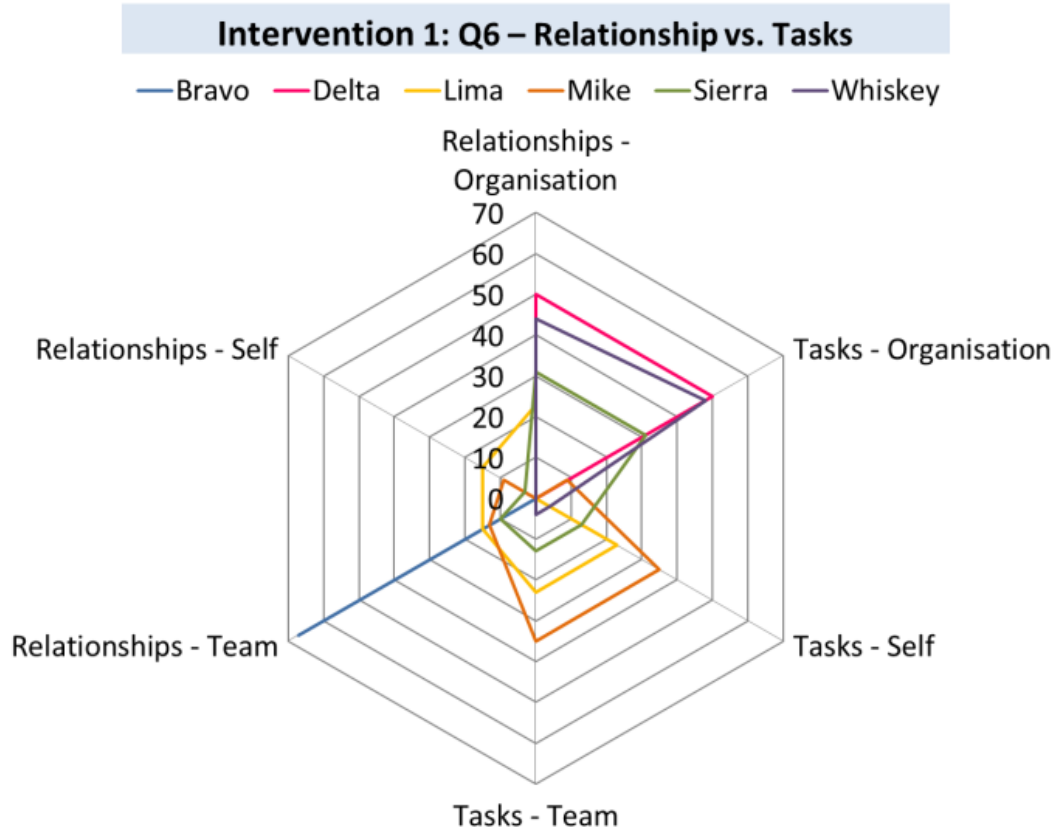
**Intervention 1: Q4 - Value of Association Memberships**

—Bravo —Delta —Lima —Mike —Sierra —Whiskey



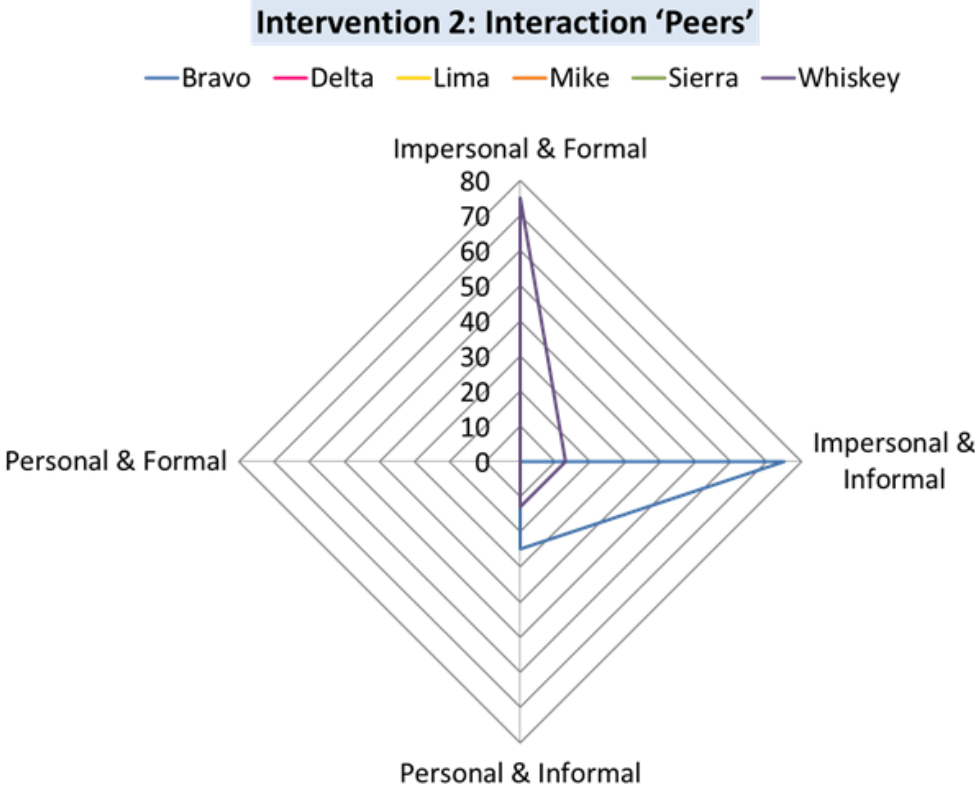
## Appendix 1-6

**Intervention 1–Question 6:** *What is the significance of interpersonal relationships and the organisational climate in exchanging knowledge?*



# Appendix 2-P

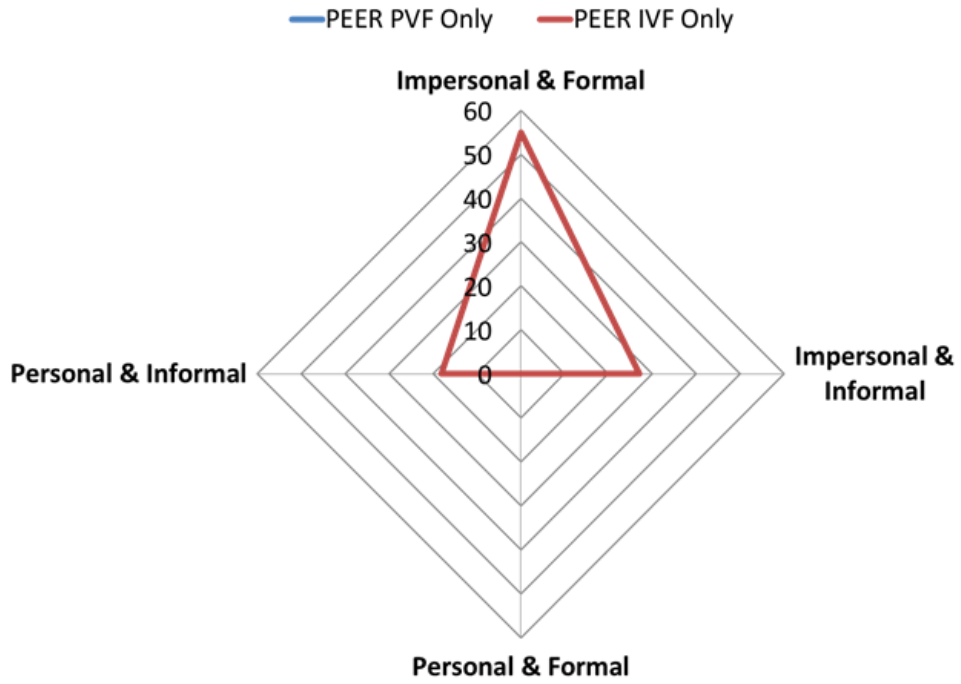
**Intervention 2**—A summary of the observations of the research participants exchanging knowledge with their *Peers*.



## Appendix 2-P/C

**Intervention 2**—A summary of the observations of the research participants exchanging knowledge with their *Peers* by 'Planned' (PVF) and 'Impromptu' (IVF) classifications.

### Intervention 2: What the overall Group DID across only PEER Status Level, by Classification – PVF & IVF



## Appendix 2-A

**Intervention 2**—A summary of the observations of the research participants exchanging knowledge with those *Above* their level of responsibility.

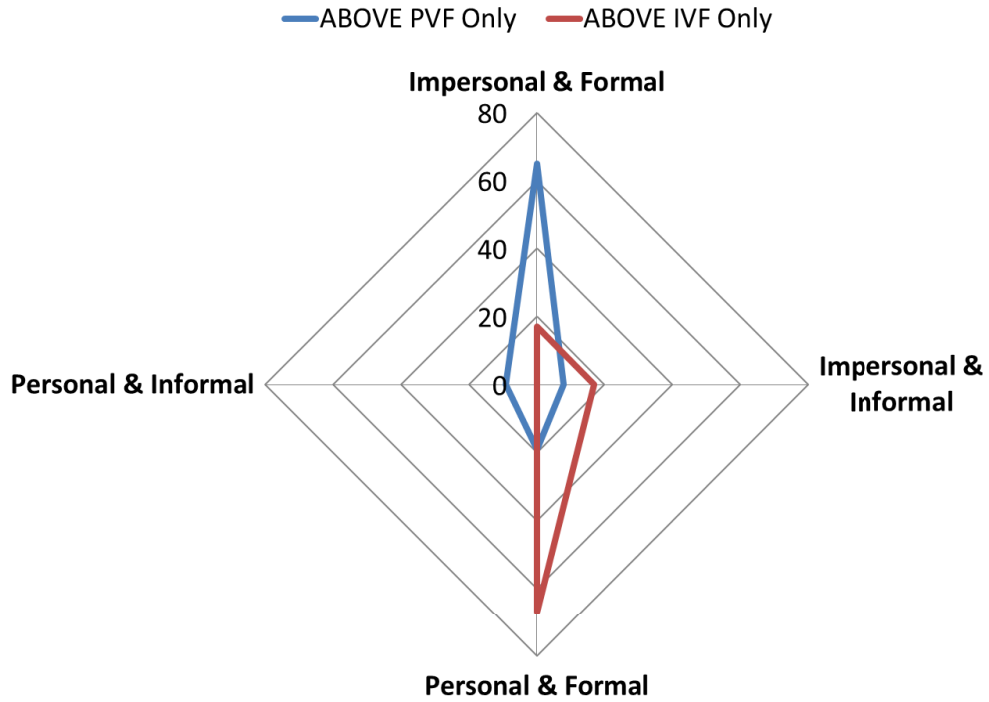
### Intervention 2: Interaction 'Above'



## Appendix 2-A/C

**Intervention 2**—A summary of the observations of the research participants exchanging knowledge with those *Above* their level of responsibility by ‘Planned’ (PVF) and ‘Impromptu’ (IVF) classifications.

### Intervention 2: What the overall Group DID across only ABOVE Status Level, by Classification – PVF & IVF

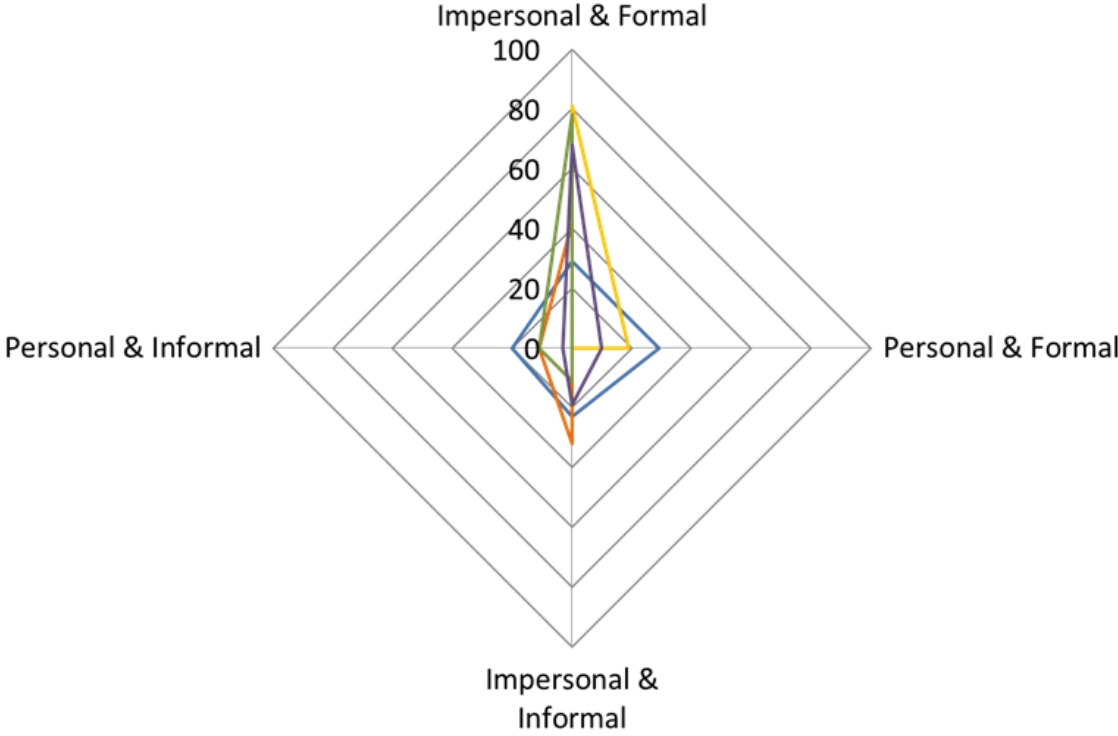


# Appendix 2-B

**Intervention 2**—A summary of the observations of the research participants exchanging knowledge with those *Below* their level of responsibility.

## Intervention 2: Interaction 'Below'

—Bravo —Delta —Lima —Mike —Sierra —Whiskey

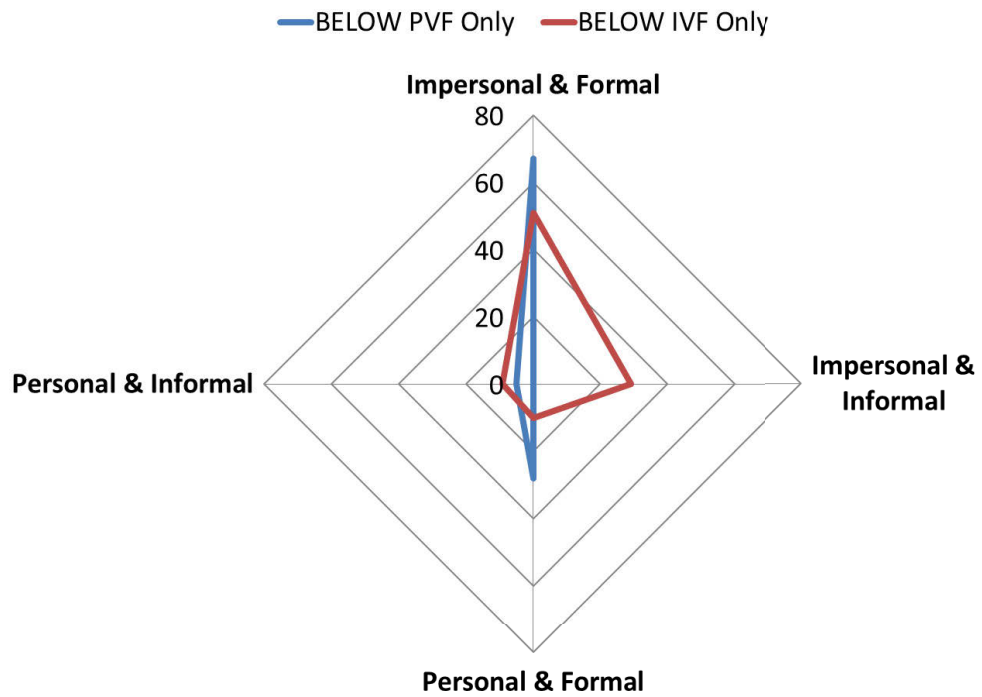




## Appendix 2-B/C

**Intervention 2**—A summary of the observations of the research participants exchanging knowledge with those *Below* their level of responsibility by ‘Planned’ (PVF) and ‘Impromptu’ (IVF) classifications.

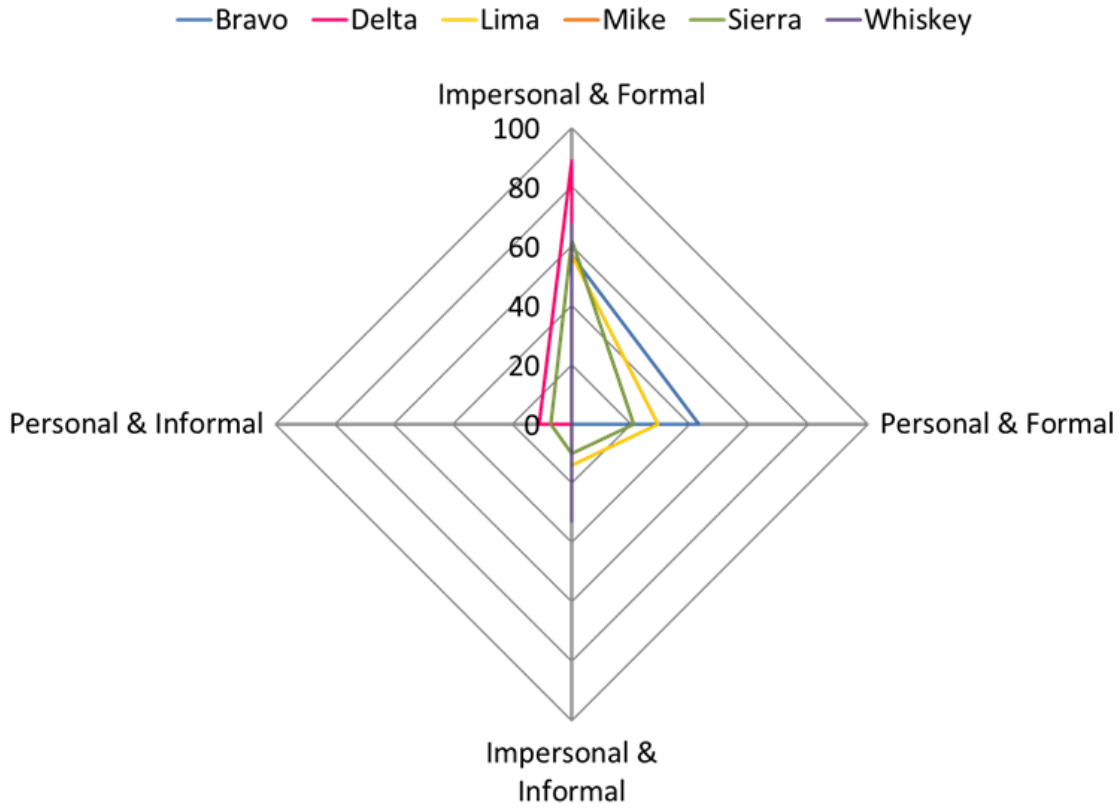
### Intervention 2: What the overall Group DID across only BELOW Status Level, by Classification – PVF & IVF



## Appendix 2-M

**Intervention 2**—A summary of the observations of the research participants exchanging knowledge with those of various *Mixed* levels of responsibility.

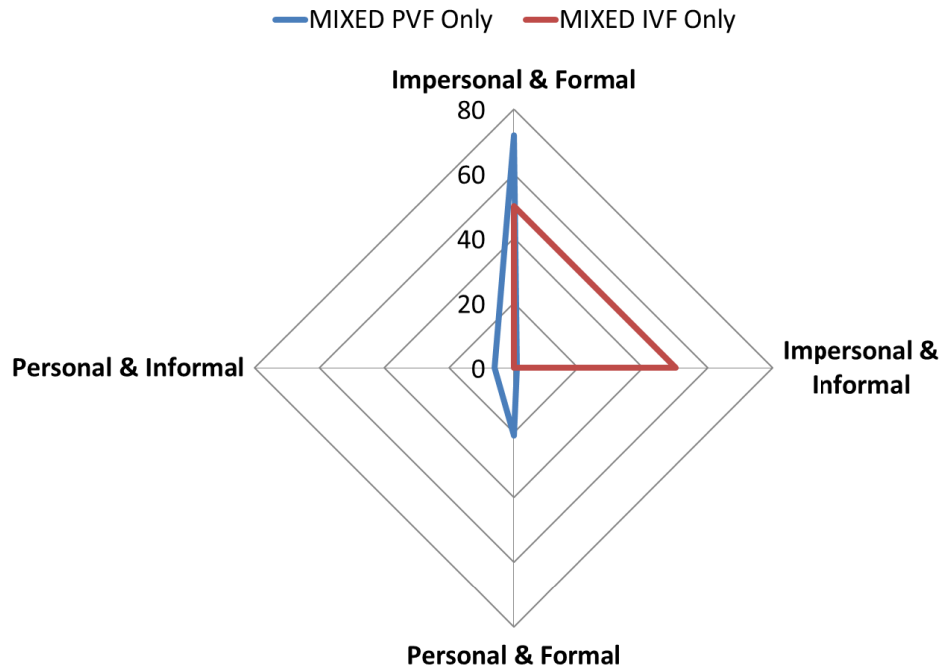
### Intervention 2: Interaction 'Mixed'



## Appendix 2–M/C

**Intervention 2**—A summary of the observations of the research participants exchanging knowledge with those of various *Mixed* levels of responsibility by ‘Planned’ (PVF) and ‘Impromptu’ (IVF) classifications.

### Intervention 2: What the overall Group DID across only MIXED Status Level, by Classification – PVF & IVF

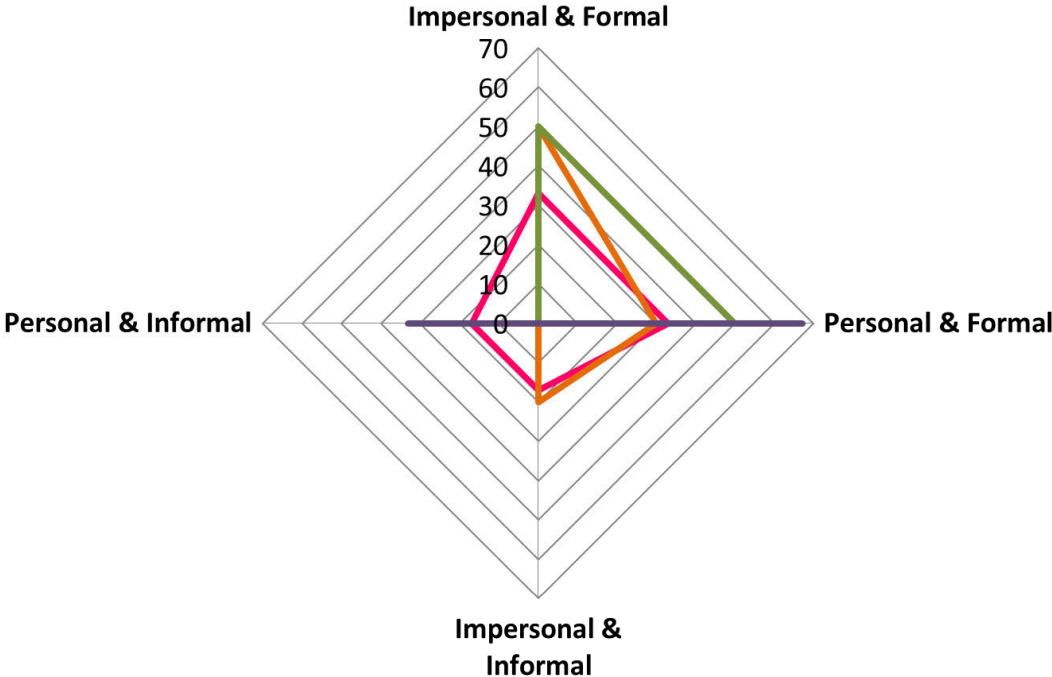


**Appendix 2-1**

**Intervention 2–Question 1:** *Tell me something about how you exchange knowledge and possibly learn from the research participant.*

**Intervention 2: Question 1 – Work Colleague Interview**

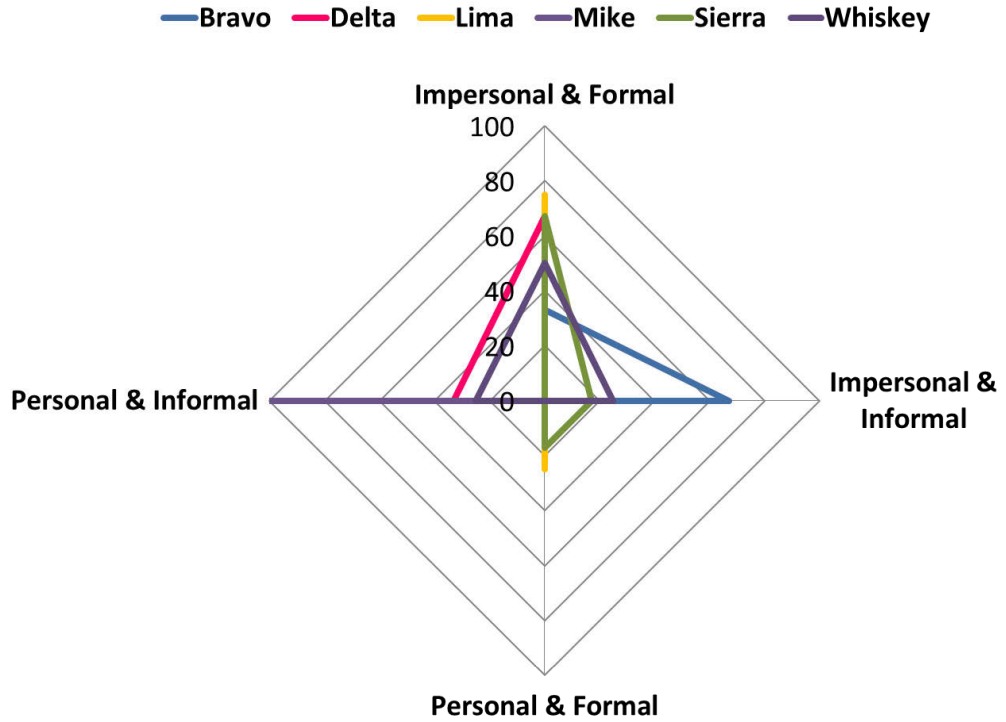
—Bravo —Delta —Lima —Mike —Sierra —Whiskey



## Appendix 2-2

**Intervention 2–Question 2:** *Experience—how does the research participant share their project management experience?*

### Intervention 2: Question 2 - Work Colleague Interview

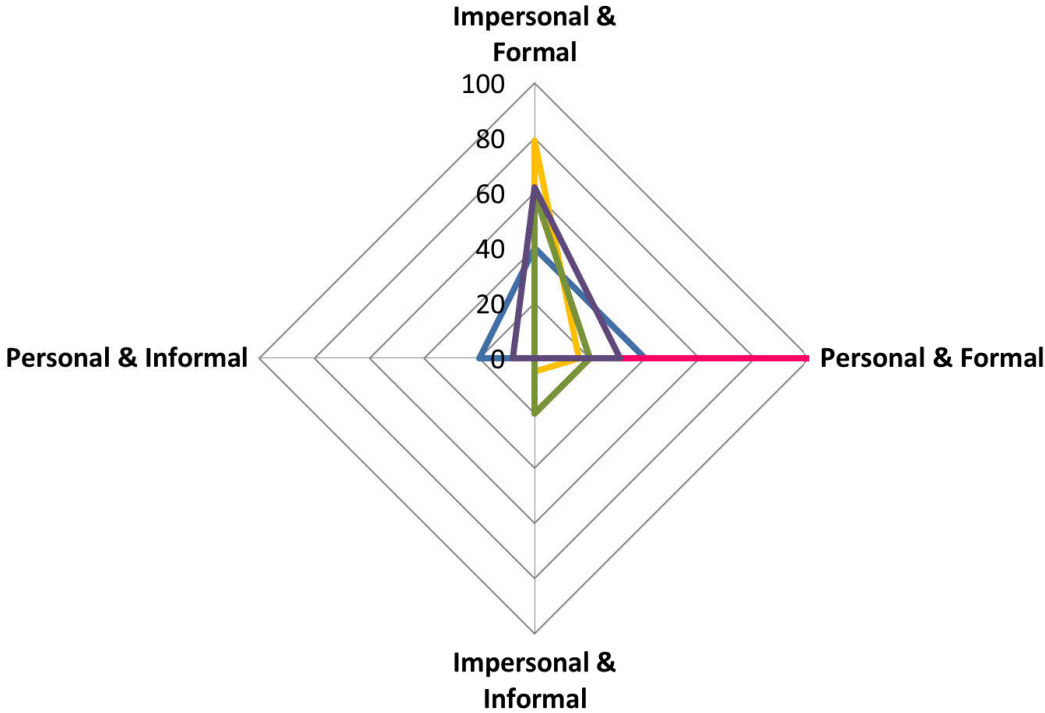


**Appendix 2-4**

**Intervention 2–Question 4:** *Behaviour–how does the research participant manage interpersonal relationships in the organisation to exchange knowledge?*

**Intervention 2: Question 4 - Work Colleague Interview**

—Bravo —Delta —Lima —Mike —Sierra —Whiskey

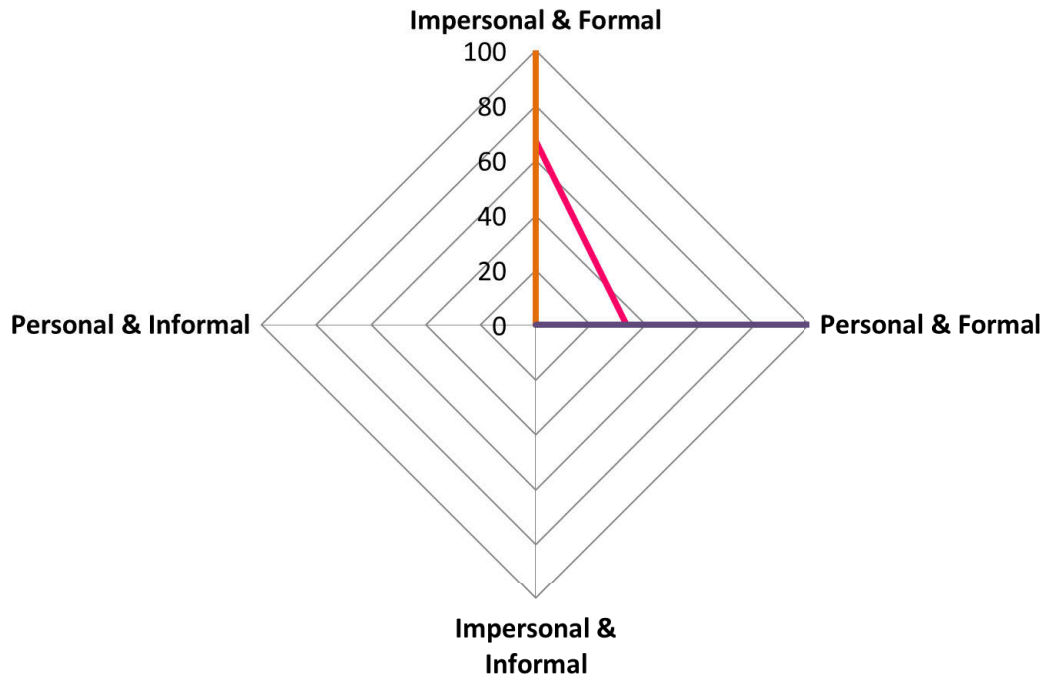


## Appendix 2-5

**Intervention 2–Question 5:** *Open–have you any other information you can share with me to help me understand the way the research participant exchanges their knowledge?*

### Intervention 2: Question 5 - Work Colleague Interview

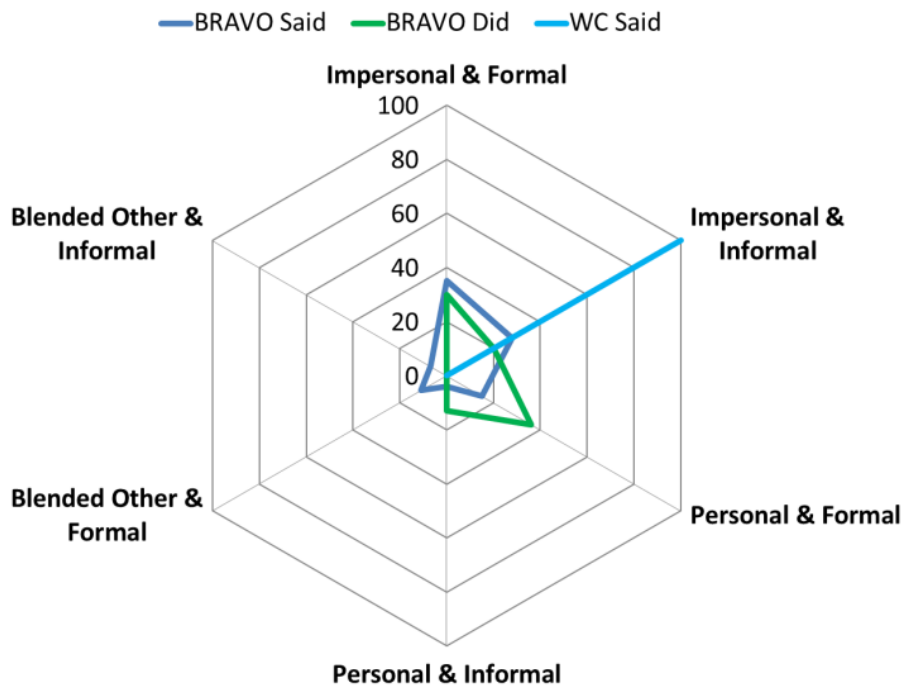
—Bravo —Delta —Lima —Mike —Sierra —Whiskey



## Appendix 4-B/SDS

Cross comparison of what Bravo said, did, and what the work colleague said about how Bravo exchanges knowledge.

### Intervention 1 and 2 – What BRAVO Said, Did and Work Colleague Said - by Category



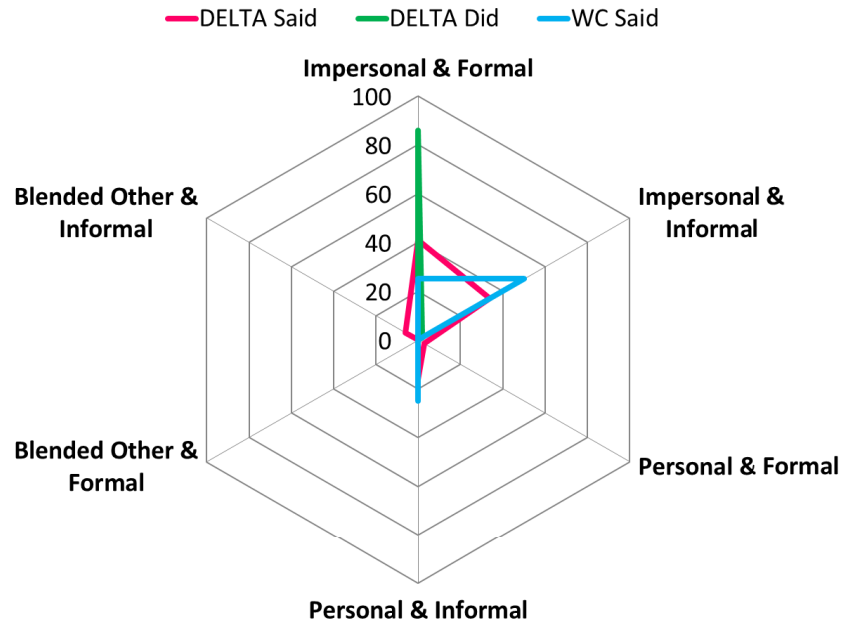
Category of Responses	BRAVO Said	BRAVO Did	WC Said
Impersonal & Formal	35	30	0
Impersonal & Informal	28	20	100
Personal & Formal	15	36	0
Personal & Informal	4	13	0
Blended Other & Formal	11	0	0
Blended Other & Informal	7	0	0
<b>Prevalence-Individual by Category (% of Total Responses)</b>			



## Appendix 4-D/SDS

Cross comparison of what Delta said, did, and what the work colleague said about how Delta exchanges knowledge.

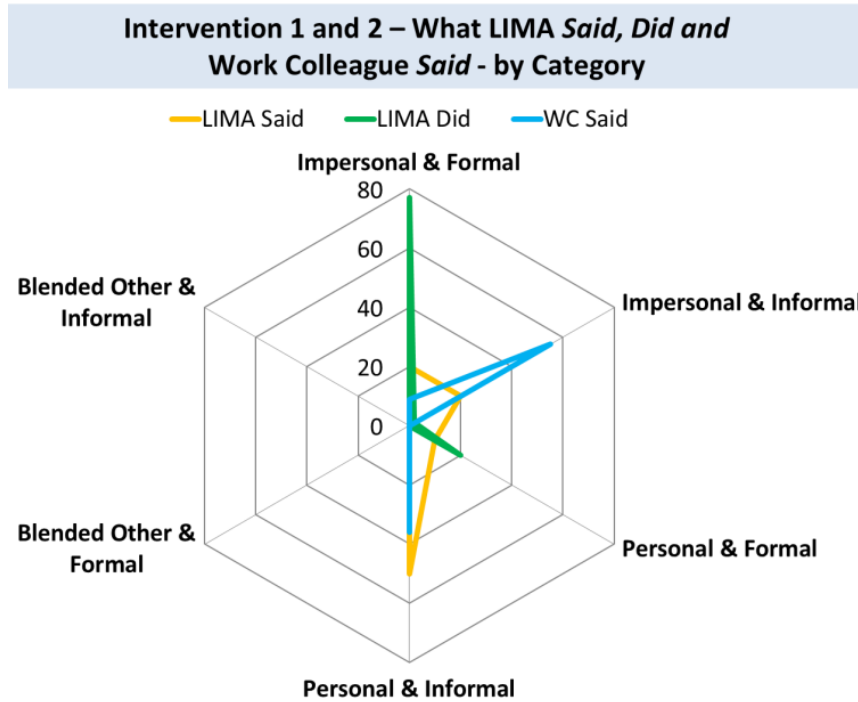
### Intervention 1 and 2 – What DELTA Said, Did and Work Colleague Said - by Category



Category of Responses	DELTA Said	DELTA Did	WC Said
Impersonal & Formal	41	86	25
Impersonal & Informal	34	2	50
Personal & Formal	3	0	0
Personal & Informal	16	12	25
Blended Other & Formal	0	0	0
Blended Other & Informal	6	0	0
<b>Prevalence-Individual by Category (% of Total Responses)</b>			

## Appendix 4-L/SDS

Cross comparison of what Lima said, did, and what the work colleague said about how Lima exchanges knowledge.

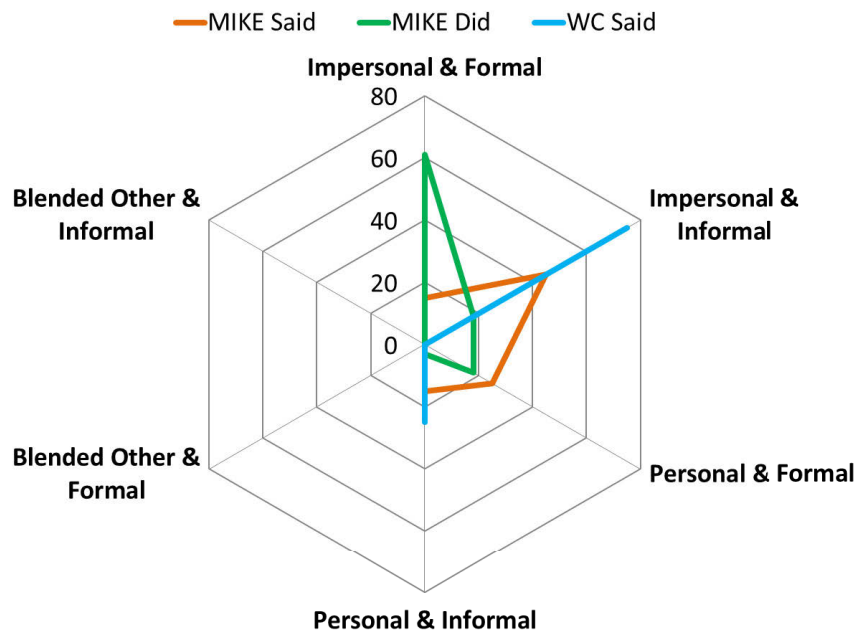


Category of Responses	LIMA Said	LIMA Did	WC Said
Impersonal & Formal	20	77	9
Impersonal & Informal	20	2	55
Personal & Formal	10	20	0
Personal & Informal	50	0	36
Blended Other & Formal	0	0	0
Blended Other & Informal	0	0	0
<b>Prevalence-Individual by Category (% of Total Responses)</b>			

## Appendix 4–M/SDS

Cross comparison of what Mike said, did, and what the work colleague said about how Mike exchanges knowledge.

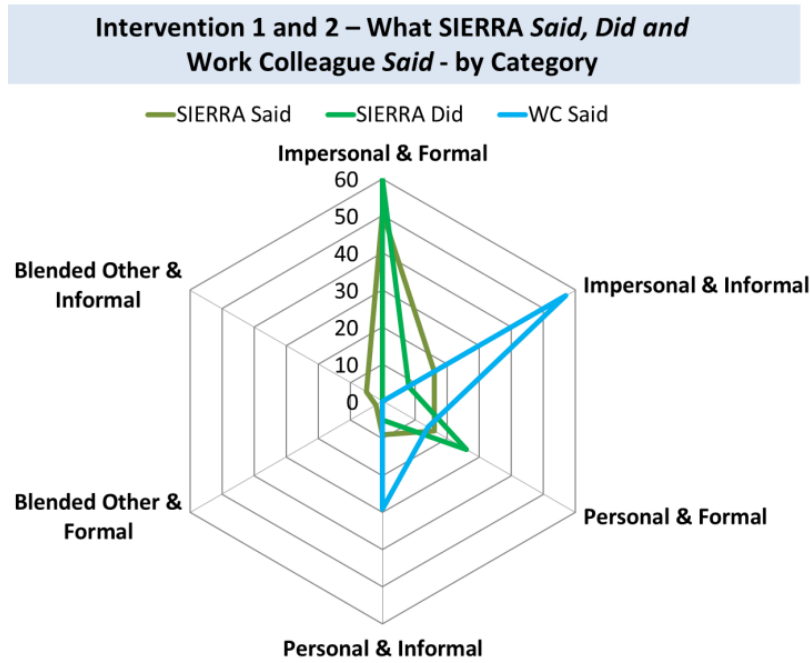
### Intervention 1 and 2 – What MIKE Said, Did and Work Colleague Said - by Category



Category of Responses	MIKE Said	MIKE Did	WC Said
Impersonal & Formal	15	61	0
Impersonal & Informal	45	18	75
Personal & Formal	25	18	0
Personal & Informal	15	3	25
Blended Other & Formal	0	0	0
Blended Other & Informal	0	0	0
<b>Prevalence-Individual by Category (% of Total Responses)</b>			

## Appendix 4–S/SDS

Cross comparison of what Sierra said, did, and what the work colleague said about how Sierra exchanges knowledge.

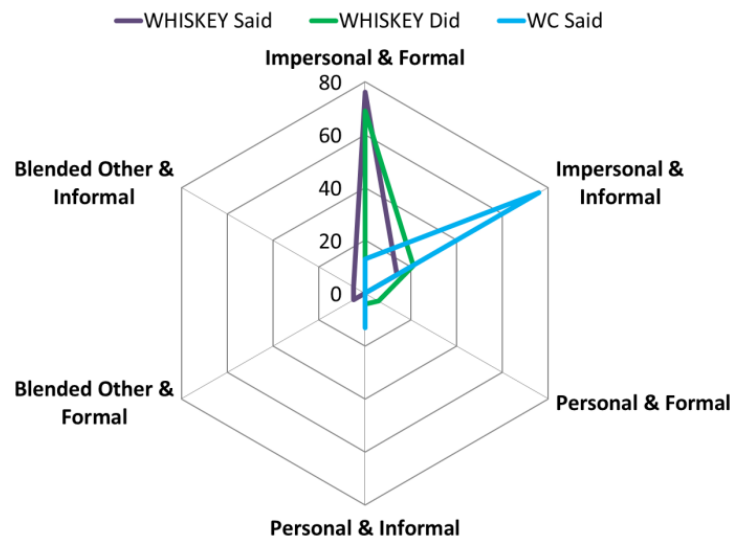


Category of Responses	SIERRA Said	SIERRA Did	WC Said
Impersonal & Formal	51	60	0
Impersonal & Informal	16	8	57
Personal & Formal	16	26	14
Personal & Informal	9	5	29
Blended Other & Formal	2	0	0
Blended Other & Informal	5	0	0
<b>Prevalence-Individual by Category (% of Total Responses)</b>			

## Appendix 4–W/SDS

Cross comparison of what Whiskey said, did, and what the work colleague said about how Whiskey exchanges knowledge.

**Intervention 1 and 2 – What WHISKEY Said, Did and Work Colleague Said - by Category**

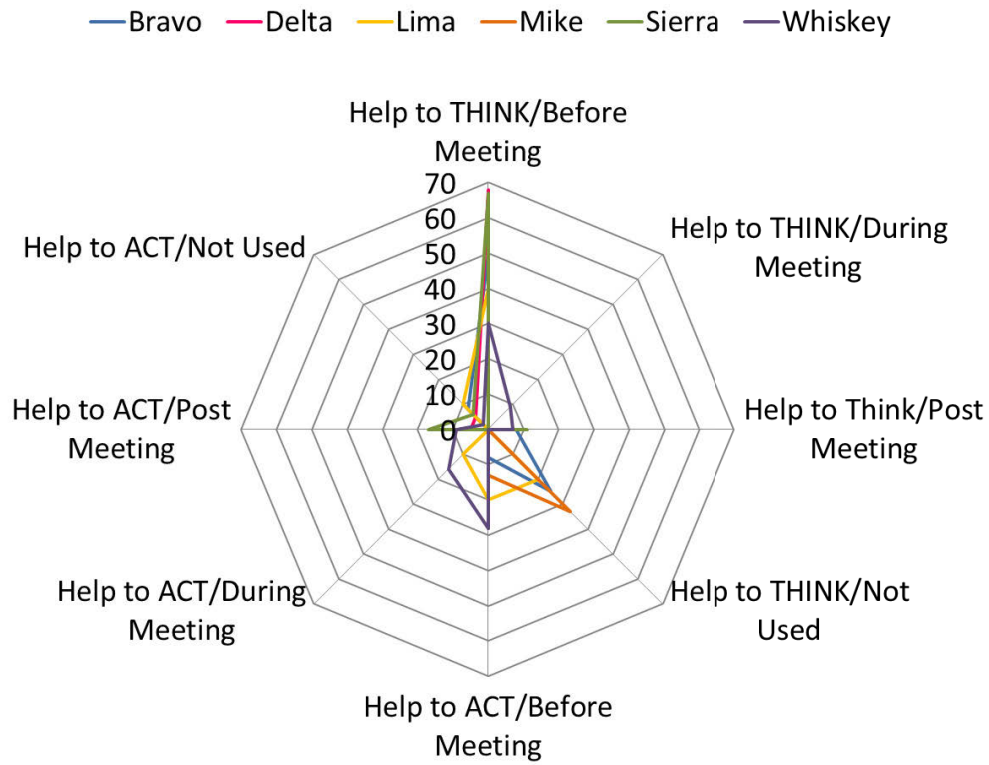


Category of Responses	WHISKEY Said	WHISKEY Did	WC Said
Impersonal & Formal	76	69	13
Impersonal & Informal	14	21	76
Personal & Formal	0	6	0
Personal & Informal	0	4	13
Blended Other & Formal	5	0	0
Blended Other & Informal	5	0	0
<b>Prevalence-Individual by Category (% of Total Responses)</b>			

## Appendix 4-1

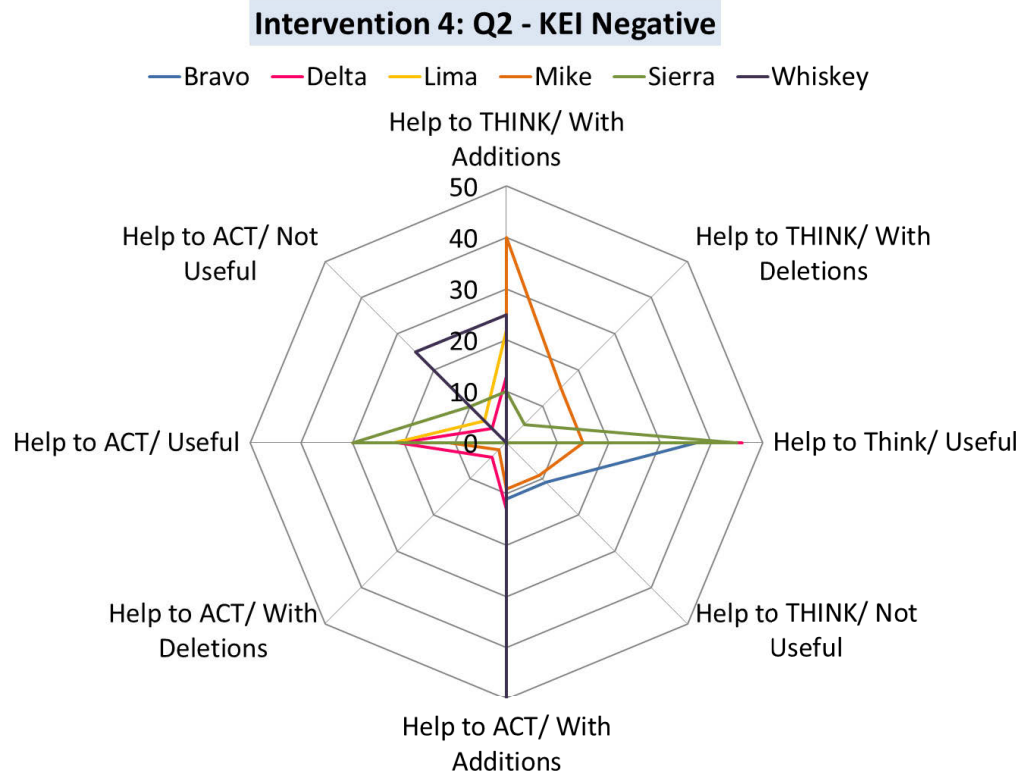
Intervention 4-Question 1: What was positive about the knowledge exchange instrument?

### Intervention 4: Q1 - KEI Positive



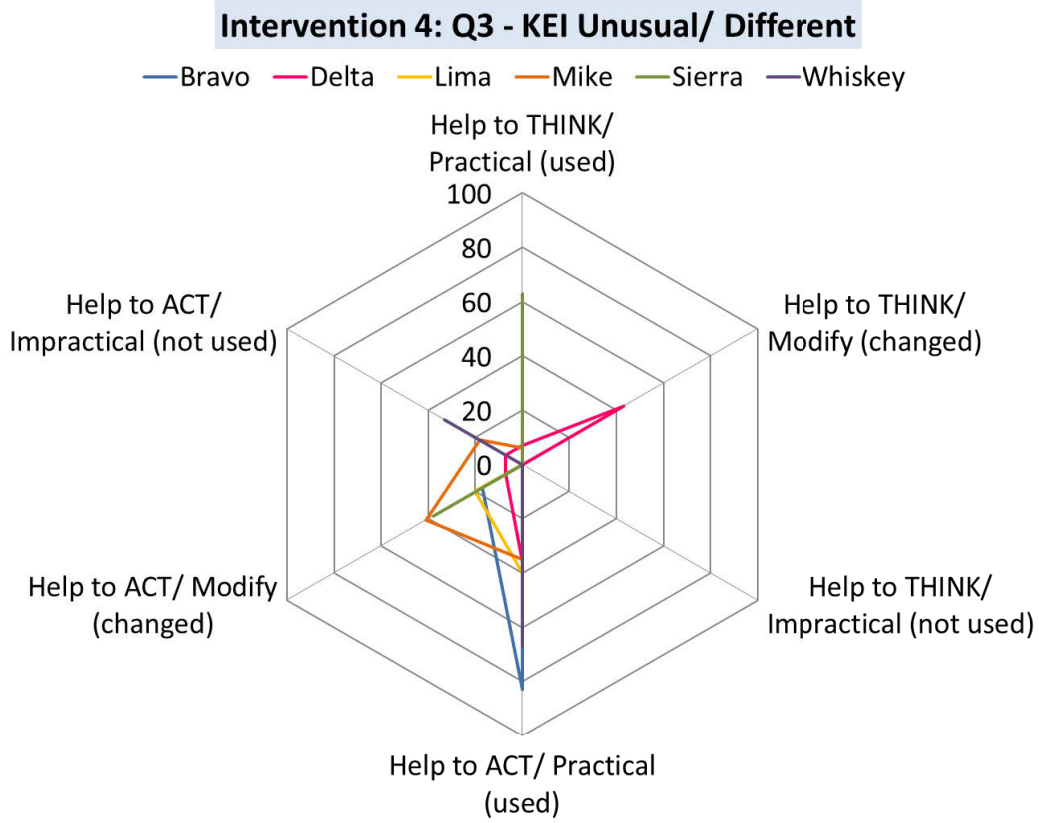
## Appendix 4-2

**Intervention 4-Question 2:** What was negative about the knowledge exchange instrument?



## Appendix 4-3

**Intervention 4-Question 3:** What was unusual or different about the knowledge exchange instrument?

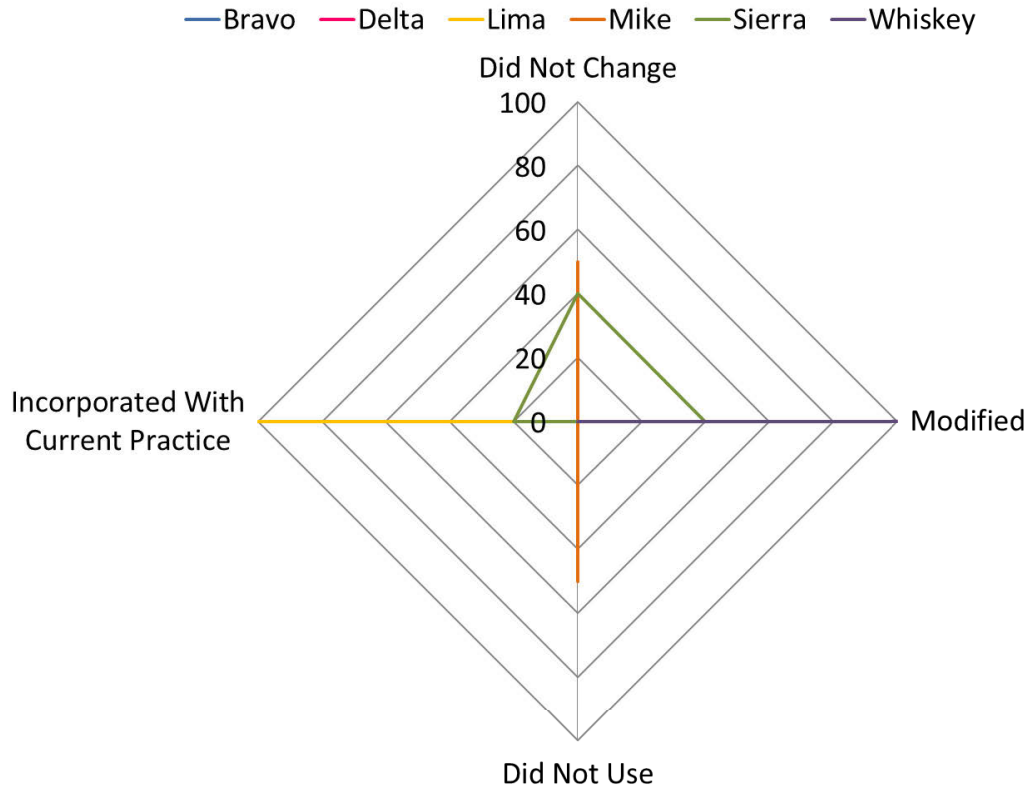




## Appendix 4-4

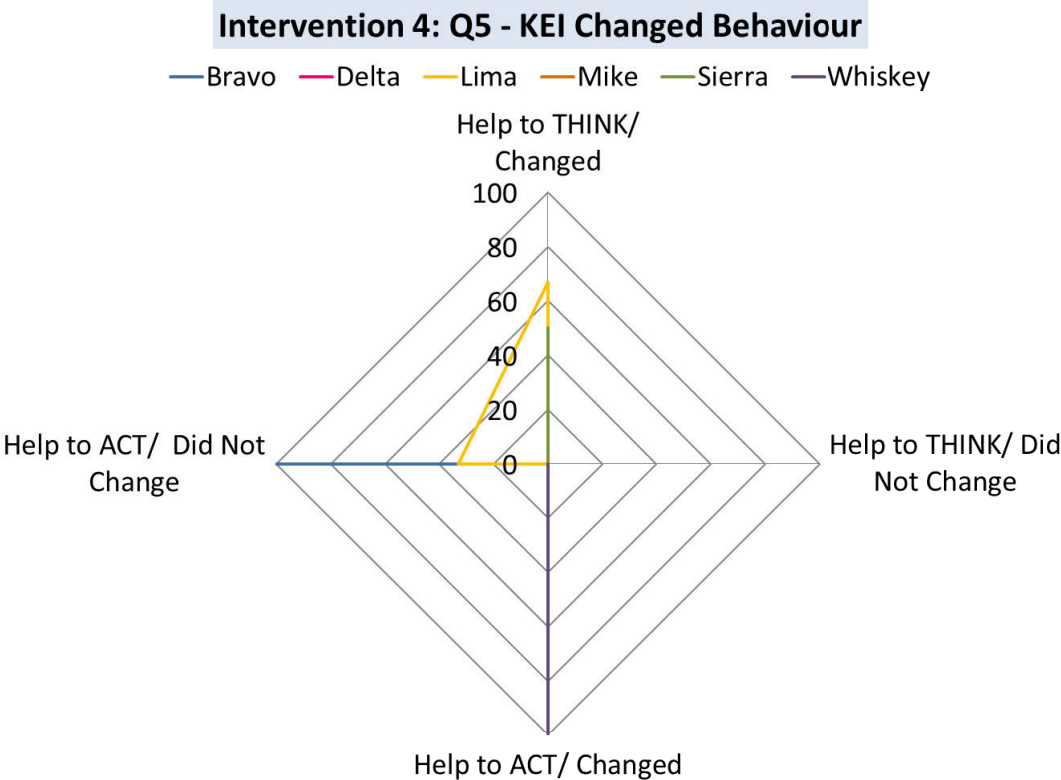
**Intervention 4–Question 4:** Did anybody actually change the knowledge exchange instrument?

### Intervention 4: Q4 - KEI Changed



**Appendix 4-5**

**Intervention 4-Question 5:** Did the knowledge exchange instrument change anybody's behaviour?



## Appendix 1-DAQ

### Intervention 1-Data Analysis Quotes by Category, by Research Participant

Question 1-Tell me something about how you became a project manager.

Data Category	Representative Quotes
<p>Evolved and Practical</p>	<p><u>Primary Quotes:</u></p> <p>'I guess just through time, projects happen and you know, you might be the technical lead for that project and you slowly become the contact for the business. Then you're suddenly managing projects.' (Lima)</p> <p>'I moved into a project officer position. Then that progressed as I became more experienced and qualified. I then became a project manager.' (Sierra)</p> <p>I managed a few of those, then a few more and a few more. When I'm not acting in this role I'm now managing that program. So that's just built up over time.' (Delta)</p> <p><u>Secondary Quotes:</u></p> <p>'It came about primarily because of a change in the organisation.' (Bravo)</p> <p>'To help develop my experience I was assigned smaller projects the right hand to the project manager and learning as I went.' (Delta)</p> <p>'So it was on a project team delivering a capital project and that's where I started to learn project management to apply what I'd done at university.' (Delta)</p> <p>'I wanted to make sure that the next place that I went to that I got proper training.' (Lima)</p> <p>'I've had lots of different roles mostly project management. When I moved out of that space, there has always been an element of project management.' (Sierra)</p> <p>'I had access to an experienced project manager. ....I was stepping into her shoes and gained a bit of an insight and took over from her project. That's kind of how I started off. It was only one project initially and then it ramped up to two.' (Sierra)</p> <p>'The experience is the main reason why I feel as though I've got the knowledge and I suppose the tools now at my fingertips to really execute a project well.' (Sierra)</p> <p>'There was some degree of progression in that I was managing things that I would probably call a small project today, but I wouldn't have called it that at the time.' (Mike)</p> <p>'I was a resident engineer at one stage and then I became a project manager in terms of de-emphasis on the engineering skills that were required and a desire to have people who were more capable of project management.' (Whiskey)</p> <p>'Chance discussion. So that's why I applied to go into a computer science degree.' (Bravo)</p> <p>Person I was also involved in all of their discussions and business requirements and so on. So that's when I started to get exposed to what the business is doing. Because before that, yes I was exposed to the business but it was limited.' (Lima)</p> <p>'I became almost like an account manager, a business development manager as well as doing - it was always project management at the same time as well.' (Sierra)</p> <p>'Over time I started doing less of the actual performance and capacity analysis and a lot more of the managing the management team and setting expectations, and started getting those elements that we'd normally associate with project management. So it was more of a shift.' (Mike)</p> <p>'The projects that I was managing in the beginning were very, very related to the technical role that I had.' (Mike)</p> <p>'I majored in project management at university. Well anything to get out of the design</p>

Data Category	Representative Quotes
	<p>subjects basically at that point.' (Delta)</p> <p>'But in that first job I was basically thrown in the deep end.' (Bravo)</p> <p>'So write the user manual, learn the system and go and teach them. Go and implement the system and teach them.' (Lima)</p> <p>'Started off as a PA in the technology space.' (Sierra)</p>
<p>Personal Values, Emotions, and Lifestyle</p>	<p><u>Primary Quotes:</u></p> <p>I could at least add value and bring some of the lessons that I've learnt along the way across to that team as well.' (Sierra)</p> <p>'The construction appealed to me and the dream of cruising around in my four wheel drive with my hard hat on the back seat and turning up at site and pulling out the blue prints and that sort of thing.' (Delta)</p> <p><u>Secondary Quotes:</u></p> <p>'I was personally I think fortunate in that I was in a location where we actually had a local design team of people and we had local construction people. I got involved in the various stages of a project from defining what clients might want through to then looking at how you might deliver that.' (Whiskey)</p> <p>'I thought I was okay. But I think emotionally I always struggled internally about people interactions and I still do to some extent.' (Lima)</p> <p>'The reason I'm doing that is because I never quite made the grade in corporate management.' (Whiskey)</p> <p>'The game ... there's a process, and you added some creativity.' (Mike)</p> <p>'That's probably why I was stressed, because my values didn't match their values or the practiced values. After about the first 10-15 years of doing the programming and really the technical bit, I was actually getting bored with it as well. So that's probably how I moved on.' (Lima)</p> <p>'I don't have sufficient passion for something else for me to make a move.' (Lima)</p> <p>'I started losing confidence. I was at the stage where I thought I'm no good elsewhere. What do I know and so on. That's when I realised that I needed to get out.' (Lima)</p> <p>'She said but you're unhappy. I said I don't care. I started something I need to finish it.' (Lima)</p> <p>'People are laughing at me and thinking I've got a project plan for myself.' (Lima)</p>
<p>Managerial Related</p>	<p><u>Primary Quotes:</u></p> <p>'I started to become more and more managerial type of responsibilities I believe as a result of being up front and enjoying the communication piece as well as the technical piece. Then learned over time as I did more of the managerial pieces to refine my organisational skills around it.' (Mike)</p> <p><u>Secondary Quotes:</u></p> <p>'I had to run projects, but basically I also managed a team of developers to deliver whatever the business needed.' (Lima)</p> <p>'I was doing people management roles - technical people management roles as well, and managing small projects.' (Mike)</p> <p>'I had a very good mentor in my early years,... was actually a consultant that came to work with us and.... taught me a lot of things about systems, about management, about managing people, about managing projects.' (Lima)</p>
<p>Personal Growth</p>	<p><u>Primary Quotes:</u></p> <p>'I wanted to make sure that the next place that I went to that I got proper training.' (Lima)</p>

Data Category	Representative Quotes
	<p>'I would say I learned through my own attempt, right or wrong, on observation. I had a couple of very good mentors. I was very, very fortunate in my career in [Company X] in that I was given things and allowed little failures.' (Mike)</p> <p><u>Secondary Quotes:</u></p> <p>'I think I've learned as much as I'm going to learn here. I want to do something else.' (Mike)</p> <p>'But I went and did work experience. I think I lasted the morning in the office and thought this is not for me.</p> <p>Some of the knowledge and the background of it would carry through.' (Delta)</p> <p>'I felt as if I didn't know anything and I felt as if when I first started work I actually had to start from scratch again.' (Lima)</p>
<p>Accidental and Informal</p>	<p><u>Primary Quote:</u></p> <p>'If we fail forward, you turn the failure into a learning moment. You absolutely absorb the learning moment, and then you adjust with the learning moment. That's what I mean by failing forward. Let's fail forward. That took some practice and I think that's where the training, sometimes by fire, was needed, in my particular case.' (Mike)</p> <p><u>Secondary Quotes:</u></p> <p>'I accepted the role as a project manager. That's when I suppose I started to get a lot more exposure around different processes and expectations which certain people had around projects and also exposure to other stakeholders as well.' (Sierra)</p> <p>'Those critical experiences you have versus reading about something which probably isn't as exciting because you weren't there and didn't have the highs and lows at the time.' (Sierra)</p> <p>'In the six months that she was my manager, she had two half-hour meetings with me - even though I requested the more regular meeting.' (Lima)</p>
<p>Social and Affiliative</p>	<p><u>Primary Quotes:</u></p> <p>'So that's why I was quite happy to go and work on that project at [Company Z] because I knew him and I knew how good he was. I wanted to work with him again.' (Lima)</p> <p>'I was very, very interested in infrastructure. I liked the way different things could fit together. You could build communities and you could build societies.' (Delta)</p> <p><u>Secondary Quotes:</u></p> <p>'Always wanted to do right by the organisation. I realised in the latter years that that was important to me. It wasn't in the beginning.' (Lima)</p> <p>'I was a cadet engineer and worked my way around the country in New South Wales.' (Bravo)</p> <p>'Very different roles, very different projects.' (Delta)</p>

Data Category	Representative Quotes
Formal	<p><u>Primary Quotes:</u></p> <p>'I became an engineer first. But I really became an engineer to become a project manager.' (Delta)</p> <p>'I suppose having discussions and bringing together our knowledge around the improvements which we could do and how we could change things and formalise things.' (Sierra)</p> <p><u>Secondary Quotes:</u></p> <p>'When you're teaching people you actually had to be really structured and have loads of patience and not to make assumptions about what they know already or don't know already.' (Lima)</p> <p>'It was all about communicating through to management and doing a lot of reporting. It got a bit kind of analysis paralysis.' (Sierra)</p>

**Question 2**–Education–what significance did formal project management training have on your development as a project manager?

Data Category	Representative Quotes
<p><b>Foundational Information</b></p>	<p><u>Primary Quotes:</u></p> <p>‘Definitely you have to have the education, but that’s a guideline.’ (Lima)</p> <p>‘There were a few different courses which I did together for the project management qualifications.’ (Sierra)</p> <p>‘At university is where I realised that project management actually had a discipline to it.’ (Delta)</p> <p><u>Secondary Quotes:</u></p> <p>‘It was basically here’s the framework, follow it.’ (Lima)</p> <p>‘Bachelor of Science majoring in Computer Science. I’ve also got Prince2 Certification.’ (Lima)</p> <p>‘Degree in operations research and mathematics.’ (Mike)</p> <p>‘Civil Engineering first class honours.’ (Bravo)</p> <p>‘honours degree in civil engineering from RMIT and a Master of Legal Studies.’ (Delta)</p> <p>‘Bachelor of Business.’ (Sierra)</p> <p>‘My original degree was in civil engineering. I got an honours degree from Sydney Uni. I have a master of environmental planning from Macquarie University. My AIPM accreditation has lapsed because I was slack.’ (Whiskey)</p>
<p><b>Integrated with Work Experience</b></p>	<p><u>Primary Quotes:</u></p> <p>‘I’ll be honest - I don’t think I’ve been to an effective project management training course yet. I gave up on them fairly early in the piece I think. The background I got at university I thought was very good. On the job training is where it’s all at.’ (Delta)</p> <p>‘Project management boot camp - the first week was theory and structure and processes and methodology and training in [Company X]’s methodology. The entire second week was a case study with role playing.’ (Mike)</p> <p><u>Secondary Quotes:</u></p> <p>‘They introduced us to the Sydney Water way of doing things.’ (Delta)</p> <p>‘If they don’t have experience behind them or learn from their mistakes - or mistakes of other people and so on then the end result is not what you want. There is some value. But it’s not the be all and end all. Because that’s the theory and then that’s the practice of how you apply - whether that works in that particular situation and really depends on the people around you and how mature they are in their knowledge of how projects run or not.’ (Lima)</p> <p>‘Leadership management type training and coaching type.’ (Lima)</p> <p>‘However here’s this business reality that I have to deal with. So it’s a matter of drawing the right balance.’ (Mike)</p> <p>‘And most of my courses have been internal SKM courses.’ (Bravo)</p> <p>‘So I think they were trying to get people ready to exit the organisation - get some credentials. You know, people that had been working as project managers but no credentials in it necessarily.’ (Delta)</p> <p>‘To be honest much of what you learn in your degree you never use again sort of thing, but the project management stuff is different, probably because I ended up in project management.’ (Delta)</p> <p>‘Coin the phrase ‘enoughness’. It helped us decide what was enough project</p>

Data Category	Representative Quotes
	management.' (Mike)
Catalyst for Other	<p><u>Primary Quotes:</u></p> <p>'I probably would have done a Masters in something, but not to be. That didn't happen.' (Bravo)</p> <p>'I did toss up doing the Master of Project Management but in looking at it in quite a bit of detail I thought I'd just be learning what I already knew.' (Delta)</p> <p><u>Secondary Quote:</u></p> <p>'That's the difference I suppose between courses and the hands on kind of informal - well it's still formal in that sense. I think most courses, you go on the course, you get the information and unless you are very good at applying it, it just kind of falls by the wayside.' (Sierra)</p>



**Question 3**–Experience–how do you gain your project management experience?

Data Category	Representative Quotes
Formal	<p><u>Primary Quotes:</u></p> <p>‘We developed a project management roadmap which is an attempt at a generic type of approach to managing a project that can be tailored for specific clients.’ (Whiskey)</p> <p>‘It was filed in systems accessible and if you took the time to do it, the archive of lessons learned was there’ (Mike)</p> <p>‘Is quite bureaucratic and it's got well established ... project delivery management system.’ (Delta)</p> <p><u>Secondary Quotes:</u></p> <p>‘Had a project management methodology. There were a certain set of deliverables - templates, and a sequence and a process and roles and responsibilities’ (Mike)</p> <p>‘Sometimes in a formalised structure. In other times it’s not that formalised.’ (Mike)</p> <p>‘PDP, a professional development planning process. Where people say what training they think they need in order to progress their career and we analyse that.’ (Whiskey)</p> <p>‘Induction program - actually getting people that were new starters three or four years ago to talk about their experience in working in the place and what they learned. The actual I guess exposure to using the roadmap comes from then working with their supervisors and getting shown what it is.’ (Whiskey)</p> <p>‘Useful articles and information that you might find handy if you want to know more about the subject that you’re dealing with.’ (Whiskey)</p> <p>‘Then we’ve got some training specifically in our roadmap.’ (Whiskey)</p> <p>‘Were lots of sort of standard programs.’ (Whiskey)</p> <p>‘We have a graduate program which ensures that all graduates over the first two years of their time with us get a certain degree of training in their specialist areas. Then in parallel with that we give them a set suite of soft skills training in terms of negotiating, critical conversations.’ (Whiskey)</p> <p>‘The experience or the exposure to that formal structure at that time.’ (Sierra)</p> <p>‘There’s a young professionals network set up. We try and get people together to share their experiences. We take the graduates on excursions to see some of the things that are being constructed if there’s an interest in that. Not just for graduates but we run lunchtime learning sessions every second month.’ (Whiskey)</p>
Informal and Accidental	<p><u>Primary Quotes:</u></p> <p>‘I sort of started to fall a little bit towards Project Management because I actually wasn’t a very good Structural Engineer.’ (Bravo)</p> <p>‘[I] was called into my boss’s office. He said do you know anything about tennis? I said oh yes I used to play tennis. Then good, well we need a project manager for the facility being built at Homebush and there are big games.’ (Whiskey)</p> <p>‘It wasn’t a planned career move by no stretch of the imagination.’ (Bravo)</p> <p><u>Secondary Quotes:</u></p> <p>‘I guess that was a learning experience that - okay I knew nothing about building but then I didn’t need to know the details about buildings because there were sufficient people with expertise in the technical requirements of the building. My role was to make sure that the facility as a whole was ready to hold a particular test event just on one year in advance of the Olympics.’ (Whiskey)</p>
Tacit	<p><u>Primary Quotes:</u></p> <p>‘We actually did do quite a bit of - anybody that had been through the process before -</p>

Data Category	Representative Quotes
	<p>other organisations - we tried to get out of their head what they'd done.' (Delta)</p> <p>'I think the thing that ultimately is valuable and what it is that I've learned with the guidance of mentors and the ability to be able to engage in different project and try different things, is foresight. It's easy to understand the methodology.' (Mike)</p> <p><u>Secondary Quotes:</u></p> <p>'We've got a couple of mentoring programs but not specifically around project management. It's more new starters feeling at home and engaged in the organisation.' (Whiskey)</p> <p>'I had an excellent mentor at that time in terms of going off and doing the job. I probably didn't talk as much in project management theory but [he] was an exceptionally good communicator and stressed the need in whatever we did for good communication. He could organise his thoughts logically and sort of helped a number of us actually develop skills and putting thoughts together in a way that could convince other people of the strength in an argument.' (Whiskey)</p> <p>'I don't think you need to teach them anything else, except to help them with their foresight.' (Mike)</p>
<p>Management Decisions, Risk and Experience</p>	<p><u>Primary Quotes:</u></p> <p>'Experience is totally important - totally. It's not only the experience, I think what I found is that I found it really, really useful to have a group of friends who are either managers or project managers or in some sort of leadership role that you can actually bounce ideas off.' (Lima)</p> <p>'I've also been a bit of trouble-shooter for the firm. Projects in trouble, I get sent there. I call myself Red Adair [American oil well fire-fighter notable for his innovative approach to extinguishing and capping fires].' (Bravo)</p> <p><u>Secondary Quotes:</u></p> <p>'You have to examine the business processes and ....so what are the organisational dynamics ....and the decision making and where power lays ... and then there's culture.' (Mike)</p> <p>'I've had very broad experience.' (Bravo)</p> <p>'Four ways; there's what drives the organisation.' (Mike)</p> <p>'Them not being able to - not wanting to listen to anybody else about how improvements could be made. It was quite frustrating.' (Sierra)</p>
<p>People Related, Communications and Social</p>	<p><u>Primary Quote:</u></p> <p>'There wasn't anybody else at that time that I could learn from. I think I stumbled through it for a while. Then we had a bit of a restructure and then I got exposed to a couple of other areas that were in a different department who had now been moved up into our space. These people also had experience in projects so that's when we started talking to each other and saying, you've done this project or you're doing this project. You know, the work you are doing, how are you doing it? What documentation are you using? Let's have a look at it. We started sharing documents and sharing information about how we would do certain things and also working with different resources as well. We were able to transfer a bit of an insight as to how best to work with certain people.' (Sierra)</p> <p><u>Secondary Quotes:</u></p> <p>'You need the moral support as well as the - getting the ideas as to how to run things.' (Lima)</p> <p>'You were working for a supervisor at that point of time and they had views on how things would be done. You either agreed or disagreed.' (Whiskey)</p> <p>'I'd ask you a whole lot of your advice to get you involved in the process.' (Mike)</p>

Data Category	Representative Quotes
	<p>'It's also the moral support because you struggle with everything when you're running a project.' (Lima)</p> <p>'Some of these were Project Manager and some of them were Project Director.' (Bravo)</p>
Adaptive and Situational	<p><u>Primary Quotes:</u></p> <p>'I've had some brilliant clients and I've had some absolute clients from hell. Absolute clients from hell. [You need to] be able to adjust your behaviour and your communications.' (Bravo)</p> <p>'So it's modifying, you base what you're doing on your experience but you also draw in experts once you've identified what they are - what's required.' (Delta)</p> <p><u>Secondary Quotes:</u></p> <p>'I find that if I am struggling with something I'll go okay Charmaine, what do you think? What did I do wrong? How would you have approached it?' (Lima)</p> <p>'One of the things we do quite regularly in my division is coaching. Coaching project managers and I thoroughly enjoy doing it.' (Mike)</p> <p>'How does the organisation change.' (Mike)</p> <p>'Was only really a month hand over but it was enough for me to then start exploring and learning things myself.' (Sierra)</p>
Evolved Hybrid	<p><u>Primary Quotes:</u></p> <p>'As soon as you get into something a bit different then you have to start working on that yourself and developing different ways and methodologies.' (Delta)</p> <p>'I was on contract staff initially for six months, but then I transitioned to permanent employment.' (Bravo)</p> <p><u>Secondary Quotes:</u></p> <p>'I think it would be quite difficult to do it with a Project Management degree.' (Bravo)</p> <p>'The greater the experience of the project manager, the more they have a tendency to go to each of these. So the very junior project manager's going to think of the rational. As you get a little more seasoned you probably think of the organisational. Third you start to think of the political and actually deal with it instead of just saying...then there's the cultural.' (Mike)</p>
Non-traditional	<p><u>Primary Quote:</u></p> <p>'You need to be courageous enough to try something new. I took that to heart.' (Mike)</p>

**Question 4**–Memberships–what is the value of project management associations in your professional development?

Data Category	Representative Quotes
Negative and Low Value	<p><u>Primary Quotes:</u></p> <p>'It was all very superficial from my perspective. For me it wasn't real and I thought I'm not getting any value out of this. I get more value just from talking to my ex-colleagues or friends about their experiences when I need real help.' (Lima)</p> <p>'The networking I thought was quite onerous - young family and that sort of thing. So I thought not right now.' (Delta)</p> <p><u>Secondary Quotes:</u></p> <p>'Miniscule.' (Bravo)</p> <p>'Because I've got work to do.' (Bravo)</p> <p>'My intention is to read it, but I never get there, never.' (Sierra)</p> <p>'I was going to go to one next week but the seven thirty start at North Sydney's a killer.' (Delta)</p> <p>'If you wanted to become more involved you needed to have attended so many courses and spend so much time doing leadership or management training.' (Lima)</p> <p>'I never felt comfortable in those sessions.' (Lima)</p> <p>I also felt that I didn't get any value out of it.' (Lima)</p> <p>I found that because you had to do after work stuff, go to their meetings and so on I think that my personal life didn't allow for that time.' (Lima)</p>
Neutral and Mixed	<p><u>Primary Quotes:</u></p> <p>'I don't know that in my case [memberships] played a particularly substantial role.' (Mike)</p> <p>'It's still of interest, but I don't have time. It's not a priority for me now. I don't even really get any benefit out of those memberships.' (Sierra)</p> <p><u>Secondary Quotes:</u></p> <p>'In the project management discipline [certification is] nice to have but it's not a requirement for a job.' (Whiskey)</p> <p>'I would go there to have a good time, not go there to learn anything.' (Bravo)</p> <p>'AIPM and PMI should be doing is actually putting that bar in place for people to have achieved a certain standard before they call themselves project managers.' (Whiskey)</p>
Positive and Valuable	<p><u>Primary Quotes:</u></p> <p>'You engage in a thought or a process experiment associated with it is that you've heard....and had me consider some new and different ideas.' (Mike)</p> <p>'I went there because I thought maybe I'll learn something.' (Lima)</p>

**Question 5**–Knowledge–can you tell me something more about how you exchange knowledge on your projects and across the organisation?

Data Category	Representative Quotes
Impersonal & Formal	<p><u>Primary Quotes:</u></p> <p>‘We’ve got an IT system that enables project staff to put lessons learned in when they come across an issue on a project.’ (Whiskey)</p> <p>‘Our post implementation reviews and our business realisation reviews and all those sorts of things. That's where a lot of the stories come out.’ (Delta)</p> <p><u>Secondary Quotes:</u></p> <p>‘They’re trying to grow that world as opposed to sharing the knowledge with our team to allow us to take away that overhead and allow them to actually perform their proper job.’ (Sierra)</p> <p>‘So my current role managing project teams I like them to be able to tell me what's happening, when it's happening, how the project is running and all those sorts of things.’ (Delta)</p> <p>‘I think in a lot of cases we’ve got quite good practices about sharing knowledge but they’re not implemented particularly well.’ (Whiskey)</p> <p>‘We have a great focus on knowledge transfer or sharing at this point in time given the number of people in senior positions who will retire within the next two years.’ (Whiskey)</p>
Impersonal & Informal	<p><u>Primary Quotes:</u></p> <p>‘To me the training - the knowledge I've gained as a project manager has come down to how good my managers and my peers were at imparting that knowledge.’ (Delta)</p> <p>‘You find a way to shortcut and the procedures and - to get around, you know to get around them and still not get a black mark.’ (Bravo)</p> <p><u>Secondary Quotes:</u></p> <p>‘One thing we’re investigating but at this point in time not probably proposing to do much about is Twitter and Facebook and social media.’ (Whiskey)</p> <p>‘So more of a getting away from the project report, but a story.’ (Delta)</p>
Personal & Formal	<p><u>Primary Quotes:</u></p> <p>‘They want us to start with a story. It's not a project report. It's a story. Which is going to be interesting - for a bunch of middle aged engineers to try and get their head around that.’ (Delta)</p> <p>But they’re not just telling stories for that sake. It's really related to something that's going on and usually there's a lesson out of it that you can apply to that.’ (Delta)</p> <p>‘They would go ‘not another story’. But it’s said in a joking manner. Everybody else shared their experiences as well.’ (Lima)</p> <p>‘Often it's not the words that they use but how they actually say it and what they're doing when they say it.’ (Delta)</p> <p><u>Secondary Quotes:</u></p> <p>‘I feel the most powerful way to share knowledge is to ask questions.’ (Mike)</p> <p>‘If you start thinking about this from different angles. The answer will come to you.’ (Mike)</p> <p>‘I am all about information sharing. The more information we know and other people know, the better that we can come together and actually plan things.’ (Sierra)</p> <p>‘I also try and talk to people outside of the project, just to get a feel for either getting</p>

Data Category	Representative Quotes
	background information or a feel for the political environment.' (Lima)
Personal & Informal	<p><b>Primary Quotes:</b></p> <p>'There are a lot of informal discussions which are constantly occurring in our team.' (Sierra)</p> <p>'It was a conversation over lunch where you really got the whole story, the big picture and what really went on.' (Delta)</p> <p><b>Secondary Quotes:</b></p> <p>'So I'm a big believer in getting out and walking around our sites, talking to them about how the project's going, letting them voice their issues and their concerns and sharing knowledge and ideas that way.' (Delta)</p> <p>'But I think that's the key to a lot of relationships - is actually the sharing. You almost build up an affinity for the other person if you understand their stories.' (Delta)</p> <p>'Most of my mentoring in Project Mangers is more informal mentoring.' (Bravo)</p> <p>'If I notice that somebody is staying really late and getting stressed out or whatever I usually try and go and find out what's going on.' (Lima)</p> <p>'I was quite happy to have a chat to the project manager. He understood and respects where we are coming from as well.' (Sierra)</p> <p>'I've shared the information and hung out the dirty linen, which you should do on bad projects.' (Bravo)</p>
Blended Other & Informal	<p><b>Primary Quotes:</b></p> <p>'You learn a little bit from good projects, but you learn a lot more from bad projects.' (Bravo)</p> <p>'Information shared is better than information retained.' (Whiskey)</p>
Blended Other & Formal	<p><b>Primary Quotes:</b></p> <p>'Quite often your information, in terms of the processes and procedures are from the last job you did.' (Bravo)</p> <p>'The more we can make information more readily assessable to staff the less we're going to make the same mistakes over again and the quicker they can get on and do things.' (Whiskey)</p>

**Question 6**–Behaviour–what is the significance of interpersonal relationships and the organisational climate in exchanging knowledge?

Data Category	Representative Quotes
Relationships – Organisation	<p><u>Primary Quotes:</u></p> <p>‘We need to run our contracts in a relationship sort of a basis rather than the old adversarial way.’ (Delta)</p> <p>‘Following up on the culture workshop. How’s it going in your area? You know what behaviours are you noticing changing? What could we do better? That sort of thing.’ (Whiskey)</p> <p><u>Secondary Quote:</u></p> <p>‘You look at this [culture] through a business model.’ (Mike)</p>
Tasks – Organisation	<p><u>Primary Quotes:</u></p> <p>‘We’ve created a culture website which has got all the plans for all the business units so everyone can see what everyone else is planning to do. There’s already been some cross fertilisation in that.’ (Whiskey)</p> <p>Each of those business units have got a culture action plan.’ (Whiskey)</p> <p><u>Secondary Quotes:</u></p> <p>‘This entire thing is turned upside down. It’s because of the nature of how they think. This is a person that thinks about the culture change first, because they were very much focussed on behaviours and signs of behaviour and influencing behaviour.’ (Mike)</p> <p>‘It’s so indoctrinated with the process - that’s part of my frustration. I keep on providing solutions or options and the time it takes for them to document it or understand it, document it, get the approval, you know, the opportunity has passed. It’s just a bit ridiculous and that’s part of my frustration.’ (Sierra)</p> <p>‘It’s just the sort of behaviours that are being identified that describe the culture we want into the future is about openness and sharing of information.’ (Whiskey)</p> <p>‘What everyone has said they want to aspire to is more sharing of information. We want this common culture.’ (Whiskey)</p>
Tasks – Self	<p><u>Primary Quotes:</u></p> <p>‘It’s about doing jobs. It is about connecting the dots. It’s about getting things done.’ (Bravo)</p> <p>‘I’m always happy to change something if somebody has a better idea or if something is not working discuss it and move on.’ (Lima)</p> <p><u>Secondary Quotes:</u></p> <p>‘You’ve got to do what’s best for the project. You have to also apply a bit of common sense to it as well.’ (Sierra)</p> <p>‘Basically I do a floor walk and I get tackled. I basically run into three project managers and they grab me and kind of ask me questions as we go before I start to move on to other people’s desks and ask them questions.’ (Sierra)</p> <p>‘As a Project Manager, you’ve got to be able to make decisions and take a risk knowing that there’s a chance that it could actually be wrong, but by God you make the decision and get on with it and take the risk. Sometimes you’ve completely fluffed it but it goes into the sub-conscious.’ (Bravo)</p>
Tasks – Team	<p><u>Primary Quotes:</u></p> <p>‘They’re thinking in terms of the environment, the behaviours, the culture.’ (Mike)</p> <p>‘We’ve been able to put some sort of control around what happened and put some</p>

Data Category	Representative Quotes
	<p>actions in place where other people have got a bit of comfort as well.' (Sierra)</p> <p><u>Secondary Quote:</u></p> <p>'I don't particularly like office politics that happens. But I try to be aware of them so that I don't get into trouble or don't step on people's toes. But sometimes you have to address it because if it hinders your project you might have to.' (Lima)</p>
Relationships – Team	<p><u>Primary Quote:</u></p> <p>'As a project manager I guess my philosophy is make the best use of your people in the team, for what they are there for.' (Lima)</p>
Relationships – Self	<p><u>Primary Quote:</u></p> <p>'The biggest influence on the behaviours of individuals is the team leader.' (Whiskey)</p> <p><u>Secondary Quotes:</u></p> <p>'It breaks down the barriers between those business units where we're trying to do the one thing across the whole business.' (Whiskey)</p> <p>'I think the fact that I've got those relationships with those people, I can understand how they work.' (Sierra)</p> <p>'I've got to take those opportunities to share that knowledge and find out what other people are doing and hear about their day so to speak.' (Delta)</p> <p>'I think the most important thing in being a project manager is being open with the people that are around you, that you have to work with on the project, because they've got ideas. You don't know everything.' (Lima)</p> <p>'It is very important to be able to network across people.' (Bravo)</p> <p>'Some people you can sit and chat with and share stories with and they'll share stories with you. We've got a really, really good project manager who is outstandingly brilliant at what he does - extremely hard working - but just does not talk to other people much at all, which is really unusual.' (Delta)</p>



## Appendix 4–DAQ

### Intervention 4–Data Analysis Quotes by Category, by Research Participant

Question 1–What was positive about the knowledge exchange instrument?

Data Category	Representative Quotes
<p>Help to THINK/Before Meeting</p>	<p><u>Primary Quotes:</u></p> <p>'I did read the information and numerous times, mainly from a perspective of going into meeting situations, because every time when you go into a meeting you've got a different audience, different people, a different subject matter and you sometimes got - have different behaviours yourself and you speak differently.' (Bravo)</p> <p>'It just made me stop and think about the preparation, it wasn't something specifically in there that said to change that but it was just a way that it was directing me to think.' (Delta)</p> <p>'I pulled out the actual diagram and really thought to myself, okay, well I know what my standard agenda is going to be... I use it as a tool to say, what else can I get out of the meeting... so I'd sit down an extra 10 minutes and try to ... really kind of think it through, which I think added really a lot of value at the end of the day.' (Sierra)</p> <p><u>Secondary Quotes:</u></p> <p>'Instinctively ... I probably didn't need this to know what to do in a meeting.' (Bravo)</p> <p>'That all relates to things like audience, how well do you know the person? You could have called it communication management instead of calling it knowledge exchange.' (Bravo)</p> <p>'It is very sensible. It's very logical, it's quite intuitive, it's not very dissimilar to what a lot of people would do anyway. Once you've used it a couple of times it's very easy, because it really is quite intuitive. (repeated - help to act before meeting).' (Delta)</p> <p>'I thought the fact that this directed me to do it in a bit more of a disciplined way.' (Delta)</p> <p>'I had to go and do the same thing but to two different audiences and really just one was to win them over and say I need your support, so you'll drill it down through your team. The other was, I need you to start doing this process.' (Delta)</p> <p>'I started thinking about what road blocks there would be to the exchanging knowledge, so it was attitudes, people's preferences, all those sorts of things and that's the one thing that did help me focus a bit more on it.' (Delta)</p> <p>'So I requested a briefing and ... I was able to bring them up to speed that way.' (Delta)</p> <p>'It was more of a reminder, a memory jogger. A lot of it is common sense and sometimes we do it intuitively but we sometimes need reminders.' (Lima)</p> <p>'Sometimes you refer to, okay, what are all the aspects do I need to address or are these aspects important at all for this particular situation that I'm in or whatever, so in that way it was a very quick, do I need to consider any of this before I go into a situation type? So that's very positive.' (Lima)</p> <p>'I found I just used it to prepare for a meeting and I have to say I wasn't diligent in using it. The only time I thought about it was like, this one is going to be a difficult meeting, let me go and have a look.' (Lima)</p>

Data Category	Representative Quotes
	<p>'It has provided a very straightforward, easy to understand way to structure a discussion and to structure the nature of what is working and what is not working, what is known and what is not known, without having to wander aimlessly through the different possibilities and nuances and potential scopes and a number of other things that a project can become.' (Mike)</p> <p>'It is something that's never been done before and there's a lot of unknowns associated with it.' (Mike)</p> <p>'When you're dealing with younger, more junior, less experienced project personnel. So I found it to be a really, really simple just throw it out there and say here are the elements of what we have to deal with on a project, let's talk about these. So you don't have to spend a lot of time explaining that, it's like I get it. Okay, let's go.' (Mike)</p> <p>'More often than not it was the relationship and the individual aspects of the guide (knowledge exchange instrument) came up as opportunity areas, which I could actually modify in my communication to try and build upon understanding those individuals and the rapport and knowing that I'm going to have to work with these people in the future.' (Sierra)</p> <p>'What this made me clearly think, okay, well on that again, on the individual, the informal side, the relationship side, let's not just look at the actual presentation itself but let's apply this to progress before, so pre-presentation and then post-presentation.' (Sierra - repeated - help to act post meeting)</p> <p>'How objective they'll be in trying to come up with it. So there wasn't a need for a lot of training or knowledge transfer into the team.' (Whiskey)</p> <p>You need to look at the technical knowledge and the personal traits. So I thought that part of the model worked fine.' (Whiskey)</p> <p>Then if you're looking at knowledge exchange early on in the project some knowledge is going to flow into the project team from stakeholders.' (Whiskey)</p> <p>We probably didn't put enough focus on the personal traits at the beginning.' (Whiskey)</p> <p>Had we better harnessed that knowledge we would have been much better prepared.' (Whiskey)</p> <p>'How can you and I work together, better, in order to pool our knowledge so [Company Y] is more successful...I am in the midst of a group of people leaving the organisation for the next three years, that will follow. We will have an enormous amount of knowledge just move out.' (Whiskey)</p> <p>'Personal traits seemed to influence the process almost as much as the nature of the relationship in that some people could grasp the knowledge in a relatively high level transfer and other people need to have almost every nut and bolt explained to them before they could take ownership of the information and start to act on it.' (Whiskey)</p> <p>'I think the nature of those relationships is critical to the information cycle because if they don't think they need to tell someone they won't and the right person then won't know. We wanted the solution to be able to translate with us.' (Whiskey)</p>
<p>Help to THINK/During Meeting</p>	<p><u>Primary Quote:</u></p> <p>'In terms of the knowledge cycle there's a certain amount of information and there's also behaviours that'll come out in that team [during the meeting].' (Whiskey)</p> <p><u>Secondary Quote:</u></p> <p>'Information cycle occurring within the team [meeting] but you need to bring in external stuff periodically.' (Whiskey)</p>

Data Category	Representative Quotes
Help to THINK/Post Meeting	<p><u>Primary Quote:</u></p> <p>'I possibly would've given the same message almost the same way and that wouldn't have worked as effectively if I'd looked at the different people, the different target audience, different motivations, all those sorts of things.' (Delta)</p> <p><u>Secondary Quotes:</u></p> <p>'I just operated the way I operate and just rely on experience and I wing it but that doesn't mean that you don't go into a meeting unplanned.' (Bravo)</p> <p>'So there was good information transfer at a project level about getting a good solution.' (Whiskey)</p>
Help to THINK/Not Used	<p><u>Primary Quote:</u></p> <p>'My thought process of attending this meeting is [the knowledge exchange instrument is] not going to work structurally for me.' (Mike)</p> <p><u>Secondary Quote:</u></p> <p>'I would have done it instinctively and gone through the things that I would normally go through, which are some of these things.' (Lima)</p>
Help to ACT/Before Meeting	<p><u>Primary Quote:</u></p> <p>'It did lead me to actually request a briefing beforehand so that I could talk to them, because I just knew that the individual and the relationship was there...it was going to be a struggle for them.' (Delta)</p> <p><u>Secondary Quotes:</u></p> <p>'It is very sensible. It's very logical, it's quite intuitive, it's not very dissimilar to what a lot of people would do anyway. Once you've used it a couple of times it's very easy, because it really is quite intuitive'. (Delta - repeated - help to think before meeting)</p> <p>'I talked about coaching with this. I looked at it and reviewed it and said, well, I haven't actually structured my thoughts around this; let me give it a try, relative to some other discussions. But only in the meeting itself, in the coaching environment I use that.' (Mike)</p> <p>'They were different specialities so the IT people talked to each other and the maintenance type people talked to each other and the procurement people talked to each other.'(Whiskey)</p> <p>Out of this influence at an organisational level how we might not create barriers to knowledge exchange. I'm not going as far as thinking about what might positively encourage it, but what we might be able to do to eliminate barriers.'(Whiskey)</p> <p>'Exercise some judgement in the things that they should recognise as a bit different and seek guidance on rather than just churning on with things.' (Lima)</p> <p>'We did provide some mentoring because we were looking for a new way of people to do things. As an organisation, probably not strong in tools to support knowledge management or information exchange.' (Whiskey)</p> <p>There was a lot of stuff at an operational level that we could have done better.' (Whiskey)</p> <p>I think we actually use skills as a synonym for knowledge.' (Whiskey)</p> <p>We've got to work out how we share the lessons learned, not just within the people that were in the room but for a broader audience.' (Whiskey)</p> <p>I think it did work as a generic process but then when you looked at applying it in individual projects it had some positive and some negative issues.' (Whiskey)</p>

Data Category	Representative Quotes
Help to ACT/During Meeting	<p><b>Primary Quote:</b></p> <p>'If we were actually conscious of how information and knowledge moved around the organisation, (the knowledge exchange instrument) would help the performance of the organisation.' (Whiskey)</p>
Help to ACT/Post Meeting	<p><b>Primary Quote:</b></p> <p>'It was termed a lessons learned review but one of the critical things about it was about knowledge exchange.' (Whiskey)</p> <p><b>Secondary Quotes:</b></p> <p>'Let's not just look at the actual presentation itself but let's apply this to progress before, so pre-presentation and then post-presentation.' (Sierra - repeated - help to act before meeting)</p> <p>'That (knowledge exchange instrument) actually made me change my behaviour in that I thought, okay, well I know who attendees are going to be, I don't know certain people, so I'm going to meet up with a couple of them prior to and engage with them and then host the meeting as well.' (Sierra)</p> <p>'[Used knowledge exchange instrument to identify] the areas that you do need to focus on and that's how I think you can modify behaviour both pre and post-meetings to really use that forum to its full advantages.' (Sierra)</p> <p>'Would give you your best starting point to try and deliver a successful project outcome.</p> <p>If our behaviours were different around the nature of these relationships then information would be shared more broadly.' (Whiskey)</p>
Help to ACT/Not Used	<p><b>Primary Quote:</b></p> <p>'Because it wasn't critical, it wasn't quite such a critical meeting.' (Bravo)</p> <p><b>Secondary Quote:</b></p> <p>'I can't say that I actually used it in the meeting. I didn't even think of using it in the meeting.' (Lima)</p>

**Question 2**–What was negative about the knowledge exchange instrument?

Data Category	Representative Quotes
<p>Help to THINK/ with Additions</p>	<p><u>Primary Quotes:</u></p> <p>‘You have to think about the habits of the recipient, are they detail oriented, do they want concepts, do they want to have a chat and do they want to see things ahead of time that they read and review?’ (Mike)</p> <p>‘What is the nature of the tools, not did you use Excel or Microsoft Project, what are the nature of the tools and the nature of - okay, that's getting more interpretive.’ (Mike)</p> <p><u>Secondary Quotes:</u></p> <p>‘When you're trying to transfer knowledge the audience, or the recipient has actually got to want to receive it and use it.’ (Bravo)</p> <p>I'm not saying the recipient perhaps doesn't want to receive it, perhaps they sort of say, well, that would be handy but really I don't report to that guy, I report to that bloke up there and he's the bloke I've got to keep happy and he and particularly if he's direct supervisor doesn't necessarily back - or only half backs the message that you're going to get across, otherwise you flog a dead horse, so it's about the recipient.’ (Bravo)</p> <p>‘It wasn't measurable; it's not something you can actually measure.’ (Bravo)</p> <p>‘It hints at that at the organisation level. You can see, no, it's a public, or it's hierarchical or if its matrix and those sorts of things but you're right at an individual level.’ (Delta - repeated in help to THINK/useful)</p> <p>‘It was, what knowledge am I trying to get across, or what knowledge am I trying to get for myself and it was about the barriers that might get in the way.’ (Delta - repeated in help to THINK/useful)</p> <p>‘They're not going to really listen or they just think this is just a bit of information that they can take or leave if they want, so yeah, it does come back to whether or not it will be picked up and whether it wants to be picked up.’ (Delta)</p> <p>‘So based on your own experience you know how to tackle it but if somebody knew how to use this they'd go, okay, so what? What do I do now?’ (Lima)</p> <p>‘I had to think about the political aspects of how to approach a meeting or a knowledge exchange situation based on the people in the room.’ (Lima)</p> <p>‘The product orientation of this is missing.’ (Mike)</p> <p>‘I can go from project discussion to an individual discussion. This would imply I could start anywhere but, all right, I go tools, I go project, I go organisations. Do I have to think that way? No, you don't.’ (Mike)</p> <p>‘Who's the client and where are they trying to get to and from that they can't get to and from today. There's a who cares and why element to this that is somehow missing.(repeated in help to ACT/useful).’ (Mike)</p> <p>‘I was thinking through this relative to, all right, I'm going to have to exchange knowledge as much as change a perception of what that knowledge means. I don't know if that's new knowledge or whatever and it just gave me a headache thinking about it so I just stopped.’ (Mike)</p> <p>‘Talk about the aspects and potentials and risks associated with various things that are happening to try to test his own perceptions.(repeated in help to THINK/useful).’ (Mike)</p> <p>‘So it's all in the heads of these people that allocate the resources.’(Whiskey)</p>
<p>Help to THINK/ with</p>	<p><u>Primary Quotes:</u></p>

Data Category	Representative Quotes
Deletions	<p>'Cycles and the arrows don't add to the value of this thing. If anything in my mind it detracts from it.' (Mike)</p> <p>Secondary Quotes:</p> <p>'I don't like the arrows in the cycle because it implies you go from one to another and it really isn't.' (Mike)</p> <p>What the heck are the arrows about ... no, disregard the arrows.' (Mike)</p> <p>'It can be awfully long.' (Mike)</p>
Help to THINK/ Useful	<p><u>Primary Quotes:</u></p> <p>'I'll do a complete assessment prior to walking into the room ... which are the type of things that are on here (knowledge exchange instrument) in different words.' (Bravo)</p> <p>'I think with people at a lower level of experience, maturity and confidence it was great as a means of packaging their thought process as they're facing the project or project situation.' (Mike)</p> <p><u>Secondary Quotes:</u></p> <p>'The only real people that you see are your direct reports, because they're the people that you can... Well, influence, ram it down their throat, whatever you like to call it but you can - and they're the people that are more likely to come to you also for advice.' (Bravo)</p> <p>'After a while you don't think about how - you don't have to actually think it through.' (Bravo)</p> <p>When you go to a meeting you think just in your mind, who's going to be there, what do I need to prepare, what do I take? Do I need to take any material, do you know what's the agenda, what are the messages that we've got to get across?' (Bravo)</p> <p>It's all the material has got to be done beforehand.' (Bravo)</p> <p>'It hints at that at the organisation level. You can see, no, it's a public, or it's hierarchical or if its matrix and those sorts of things but you're right at an individual level.' (Bravo - repeated in help to THINK/improve additions)</p> <p>It was, what knowledge am I trying to get across, or what knowledge am I trying to get for myself and it was about the barriers that might get in the way.' (Delta - repeated in help to THINK/improve additions)</p> <p>'Then it twigged one day that you could actually write this as a risk management process.' (Delta)</p> <p>'There's plenty of people that I work with that could benefit from this if they used it ... you have no idea or what it is, or you meet with them and you have no idea what it is that they're actually trying to get from you or for you to get from them.' (Delta)</p> <p>'I'm going to meet with you every fortnight to touch base or whatever and it's some basic things like what's the purpose of this, what are we trying to achieve, would be effective but this would also help as a guide?' (Delta)</p> <p>'So we actually developed a strategy for the meeting ... so you take that (the knowledge exchange instrument) to the meeting.' (Delta)</p> <p>'When I used it, I jumped about I didn't even notice the arrows.' (Lima)</p> <p>What was the objective of the meeting or the situation and what outcome did I want at the end of it. So I used those two above the attributes that were listed in the cycle.' (Lima)</p> <p>It was more about communication, what style of communication and what structure do I need to use, rather than knowledge exchanging.' (Lima)</p>

Data Category	Representative Quotes
	<p>'Talk about the aspects and potentials and risks associated with various things that are happening to try to test his own perceptions.' (Mike - repeated in help to THINK/improve additions)</p> <p>'Which of the main aspects, the top three, that I wanted to focus on and I'd pick them. Then say, well, what's the amount of focus that I want to dedicate towards that during the meeting, because I think where we can get unstuck is that you can have too many agendas, too many things to try and cover off in a particular noisy scene. So you have to really look at that and prioritise it.' (Sierra)</p> <p>I know what I'm going to talk to them about but how else can I benefit, how can they benefit from this meeting? What other things can we do differently to really kind of beef it up a bit?' (Sierra)</p> <p>I've got a lot of experience doing it but I wouldn't put myself in the expert category but at the same time I wouldn't take it along to a meeting, that would cause a lot of difficult situations but I would still get value when referring to it).' (Sierra - repeated in Help to ACT/not useful)</p>
Help to THINK/ Not Useful	<p><u>Primary Quote:</u></p> <p>'Do you need to put something down that has some structure? Do they prefer not to have structure? I don't know anybody that's confident that needed this structure.' (Mike)</p> <p><u>Secondary Quote:</u></p> <p>'Maybe that's probably the way in and it would be detrimental. It would be detrimental to put that structure in front of people that I've been working with.' (Mike)</p>
Help to ACT/ with Additions	<p><u>Primary Quotes:</u></p> <p>'This didn't help me with the how. It just identified what I needed to look at but not how to approach it based on the scenario that I'm in.' (Lima)</p> <p>'Most of the time I'm talking with senior people, they're thinking my business realisation and processes and the product, which is very, very lightly touched upon in the overt pieces of this model.' (Mike)</p> <p><u>Secondary Quotes:</u></p> <p>'You hope they take it on-board but you actually - because you're not there - they're not direct reports to you; you don't know how much they're taking on-board.' (Bravo)</p> <p>'Those inhibitors to that, what is going to prevent, and it could be you don't have any authority.' (Delta)</p> <p>'The political aspects of the people you are dealing with. It wasn't explicit here and people....' (Lima)</p> <p>What hidden agendas they had ... which wasn't explicit. I know it's hinted a bit.....in terms of personal traits and power.' (Lima)</p> <p>'It jumped from one - relationships are multi-faceted and the discussion could, would and should be multi-faceted.' (Mike)</p> <p>'There are templates and constructs. There isn't a construct for an email but I hadn't used it as email but it would be relative to - I'll call it standard deliverables or things that are expected in the organisation that I am working in at the moment, this would not have fared.'(Mike)</p> <p>'There is different requirements - I didn't understand, and this was one part I guess that I didn't see how it worked in the model - but organisational maturity and then under that you've got project management risk and discipline. I didn't see how they related to maturity.' (Whiskey)</p>

Data Category	Representative Quotes
Help to ACT/ with Deletions	<p><u>Primary Quote:</u></p> <p>'It was about the barriers that might get in the way.' (Delta)</p>
Help to ACT/ Useful	<p><u>Primary Quotes:</u></p> <p>'I think you write it down and that was one of the main benefits as to how I - what I got from it, because by writing it down - because as I was saying, you have your stock standard agenda, you know yourself, you know what you've got to do, that's the easy stuff.' (Sierra)</p> <p>'I use it in preparation for where I was trying to impart knowledge.' (Delta)</p> <p><u>Secondary Quotes:</u></p> <p>'I knew who the audience was, you're throwing in anecdotes, you're throwing personal experience, the material was good, you know the environment was good, you give them lunch.' (Bravo)</p> <p>Where people may use this type of thing is when you are in the interview process...referred to as our tender interview.' (Bravo)</p> <p>'When it's extra work and something different.' (Delta)</p> <p>'If I'm meeting with somebody and I know they're particularly hopeless at sharing what they're supposed to be sharing with me... I could actually ask them to do some preparation.' (Delta)</p> <p>'I didn't use it as a cycle; I think I used it more as a checklist.' (Lima)</p> <p>Which was fine for experienced people, because like for me it was like, okay, I need to do that. Okay, how do I do that?' (Lima)</p> <p>'Who's the client and where are they trying to get to and from that they can't get to and from today. There's a who cares and why element to this that is somehow missing. (repeated in help to THINK/improve additions).' (Mike)</p> <p>'There's a reason to convey that information, there's a reason to receive that information, there's a reason why they've called you to their office... You respond and you hopefully anticipate and not just react.' (Mike)</p> <p>'I didn't use it as a cycle; I think I used it more as a checklist.' (Sierra)</p> <p>'I looked at it from probably like someone was saying before a more natural communication level and how I can build on a relationship and individuals and that is not necessarily through knowledge but probably through communication.' (Sierra)</p> <p>'I would never take along that diagram and somebody's taking down and they'd like to see a formal agenda on the table. So it's all got to be done, covertly as well.' (Sierra)</p>
Help to ACT/ Not Useful	<p><u>Primary Quote:</u></p> <p>'I've got a lot of experience doing it but I wouldn't put myself in the expert category but at the same time I wouldn't take it along to a meeting, that would cause a lot of difficult situations but I would still get value when referring to it.' (Sierra)</p> <p><u>Secondary Quotes:</u></p> <p>'If I didn't think there was going to be a problem, I didn't bother [to use it].' (Lima)</p> <p>'So we don't have it in a database because there is all sorts of HR issues around saying this person is good, bad or otherwise, he's experienced; so it all got too hard to systematise it.' (Whiskey)</p>



**Question 3**–What was unusual or different about the knowledge exchange instrument?

Data Category	Representative Quotes
<p>Help to THINK/ Practical (used)</p>	<p><u>Primary Quote:</u></p> <p>‘I picked up the guide (knowledge exchange instrument) and had a look at it and kind of thought, where did we go wrong, why did we only have partial success, what was that barrier? If it jumps out in front of me looking at the knowledge exchange and it was clear that the these executives didn't have the relationships within that investment team, they needed to be meetings beforehand and support, almost like you're going in for a campaign. You need to know who's going to back you and I don't think that was done but that was just observing the guide (knowledge exchange instrument) and it kind of went, yeah, that is something that we just didn't do.’ (Sierra)</p> <p><u>Secondary Quote:</u></p> <p>‘I had to interpret it in my own way and when I did that ... I wasn't sure how the rest of you were going to interpret it, for me it wasn't explicit and maybe it wasn't to be but if it wasn't meant to be then I needed to know that it wasn't meant to be.’ (Lima)</p>
<p>Help to THINK/ Modify (changed)</p>	<p><u>Primary Quotes:</u></p> <p>‘They're all linked together and there should be one splattered sort of starred arrow thing in the middle, if you need arrows, because one is going to affect the other.’ (Mike)</p> <p>‘Mine was more about communicating something or exchanging information or knowledge or receiving.’ (Delta)</p> <p><u>Secondary Quotes:</u></p> <p>‘When I was doing something to people from very different parts of the organisation and although it's the same organisation, not just the individuals but actually the groups within them, so some parts of our organisation are very forward thinking.’ (Delta)</p> <p>‘I don't know what the correct one is, it's the work environment or the structure they come from, maybe culture of where they come from, something like that.’ (Delta)</p>
<p>Help to THINK/ Impractical (not used)</p>	<p><u>Primary Quotes:</u> none</p>
<p>Help to ACT/ Practical (used)</p>	<p><u>Primary Quote:</u></p> <p>‘I chose to implement this as a closed experiment. Only I knew about the experiment.’ (Mike)</p> <p><u>Secondary Quotes:</u></p> <p>‘The issue of the project, you use a different communication mechanism.’ (Bravo)</p> <p>‘You can't learn - you can't be taught communication management in the scheme of things, it's just an acquired skill.’ (Bravo)</p> <p>‘It's communication management with people.’ (Bravo)</p> <p>‘It's not something that can even be easily taught, exchange management and we talked earlier about this being a bit of a tool that might help with some of that coaching.’ (Delta)</p> <p>You're doing it off the top of your head and think of the audience, think of what you're trying to walk out of there with and think of what you don't want to walk out of there with and all that prep sort of work.’ (Delta)</p>

Data Category	Representative Quotes
	<p>'Something like this could be helpful with that, maybe ease the heartache of sending people along in your place and trusting them and all those things.' (Delta)</p> <p>'We have developed a construct of the way in which we think through how are we going to conduct a meeting, how are we going to conduct a conversation, how are we going to think about our own methods of managing the project.' (Mike)</p> <p>'I would get very directive but that's typically not my style but the situation warrants it.' (Mike)</p> <p>'This was - so I ended up re-drawing your circle and taking - I didn't quite know whether the organisation was an actual part of the process or just something that influenced the behaviours of the individuals in that area.' (Whiskey)</p>
<p>Help to ACT/ Modify (changed)</p>	<p><u>Primary Quote:</u></p> <p>'In all its (knowledge exchange instrument) forms you just use the number of different types of communication that you use in a single day with a different audience.' (Bravo)</p> <p><u>Secondary Quotes:</u></p> <p>'Some people just don't have it, because they haven't been exposed to it, they haven't learned it, they haven't experienced it. A bit of training, a bit of coaching and a bit of experience they get it that can help them get it.' (Delta)</p> <p>'My ability to experiment with this [laughs] was limited, because I don't know, do you get a second shot at this?' (Mike)</p> <p>'One that I'm working with being an internal productivity exercise and another one that has significant compliance ramifications, you treat those projects... quite differently, The nature of the people that are attracted to work on them are very, very different.' (Mike)</p> <p>'A completely different beast and part of it ... is individuals. Yes, it is but it's the nature of the project that turns their minds.' (Mike)</p> <p>'I wouldn't even take along the information, I'd manage it - even if I had to, I'd put it in a format which nobody would have a clue that it's actually some sort of approach or methodology, because people would just look at you and start going, what the hell is that?' (Sierra)</p>
<p>Help to ACT/ Impractical (not used)</p>	<p><u>Primary Quote:</u></p> <p>'I struggled with the term cycle, it's like a continuous improvement cycle.' (Delta)</p>

**Question 4**–Did anybody actually change the knowledge exchange instrument?

Data Category	Representative Quotes
Did Not Change	<p><u>Primary Quote:</u></p> <p>'I'd kind of prioritise them [the knowledge exchange instrument sections] as to what order I'd approach and then kind of slot it into my agenda.' (Sierra)</p>
Modified	<p><u>Primary Quotes:</u></p> <p>'I turned it into a simple list. It really was like a check list and I started with the organisation, because that was the biggest picture and then followed the cycle, because it was just a list. It just made it sit in my mind easier and seemed logical.' (Delta)</p> <p>'I started to think about just a pyramid and within a pyramid I'd have - whether it'd be the particular areas that I wanted to focus on.' (Sierra)</p>
Did Not Use	<p><u>Primary Quote:</u></p> <p>'In my case it didn't feel like changing your model, it felt like substituting my own.' (Mike)</p>
Incorporated With Current Practice	<p><u>Primary Quote:</u></p> <p>'I think I just used it and went, okay, these were the gaps that were missing for me and just add it to whatever I was preparing. I didn't think about changing the model.' (Lima)</p> <p><u>Secondary Quote:</u></p> <p>'I started fiddling around with it first and changing it five times but I started to towards the tail end, say, well okay there's got to be some easier where I can outline or can outlay my knowledge exchange agenda on top of my normal agenda without it being too complex. Just to have something next to me to remind me of what are the points from the knowledge exchange and to what's incorporated within my current agenda.' (Sierra)</p>

**Question 5**–Did the knowledge exchange instrument change anybody's behaviour?

Data Category	Representative Quotes
Help to THINK/ Changed	<p><b>Primary Quotes:</b></p> <p>'This ... is what I want to get out, but because I had to do this it made me think of it in a more structured way.' (Lima)</p> <p>'Seize the opportunity so I can get out of it and modify both the communication before, during or after businesses, because you get those opportunities whether they're now or later. So there's always a strategic type of way that I can modify my behaviour.' (Sierra)</p> <p><b>Secondary Quotes:</b></p> <p>'I wonder if it was the tool that made me think in a more structured way or the fact that Chivonne had asked us to take the time to use it all.' (Delta)</p> <p>'It was more of a reminder to do your prep in the most structured manner. I'm very much like Bravo, five minutes before meeting, what am I going to do?' (Lima)</p>
Help to THINK/ Did Not Change	<p><b>Primary Quotes:</b> none</p>
Help to ACT/ Changed	<p><b>Primary Quote:</b></p> <p>'What we're trying to do is as many different approaches that aren't conflicting, to encourage people to share knowledge, because there's an awful lot of it going to walk out of the door.' (Whiskey)</p> <p><b>Secondary Quotes:</b></p> <p>'Was it the tool or was it the time, that's what I kept - that's why I kept coming back. But there were one or two instances where I thought, without the tool and without the discipline, I may not have come up with that.' (Delta)</p> <p>'It gave me a coaching framework for a junior person that was simpler than the one that I was using.' (Mike)</p>
Help to ACT/ Did Not Change	<p><b>Primary Quotes:</b></p> <p>'I looked at it but I just then went and.....then went and did my own thing and then recorded some of the events arising out of the communication.' (Bravo)</p> <p><b>Secondary Quotes:</b></p> <p>'I don't think it changed mine.' (Lima)</p>

## **Chapter 5: Discussion**

*'The greatest difficulty lies not in persuading people to accept new ideas, but in persuading them to abandon old ones.'*

John Maynard Keynes, British economist (1883–1946)

### **5.1 Introduction**

This action research study evolved from my review of literature regarding how contextual environments and (drivers) incentives (or motivators) influenced the way project manager acquire and exchange knowledge in the Australian workplace.

This chapter presents the research data which was collected and analysed to address these questions, discussion supporting the research claims and an examination of relevant theories. These research claims are presented with supporting evidence divided into four parts and aligned to the primary and secondary research questions. Reasoning links and their justification will be outlined so as to support a deeper understanding and extension of the findings to relevant theories. The steps taken to validate the research will be described, including the use of multiple perspectives and evaluation.

### **5.2 Research Claims**

The research has been undertaken on the assumption the answers to the research questions will generate a contribution to the practice of project management, academia, and policy makers in professional associations. I have based the research claims on the purposeful sample of experienced project managers working in Australia. The claims of the research and several counter claims have been included in Table 19 below.

Table 19: Research claims and counter claims

Research Claim	Research Counter Claim
<p><b>RC-1</b></p> <p>Knowledge is acquired through practical experiences which are integrated with formal training in an informal way with the support of mentors.</p>	<p><b>RCC-1</b></p> <p>Integrating formal, or explicit, and informal, or tacit, knowledge may result in 'knowledge leakage' requiring '... the "right" amount of knowledge acquisition and codification' (Dalkir 2005, p. 104) to occur.</p>
<p><b>RC-2</b></p> <p>Knowledge exchange is valued in the management of projects, is predominantly impersonal and formal, and occurs in a social, systematic manner for beneficial outcomes to occur.</p>	<p><b>RCC-2</b></p> <p>A perception of little value being gained from supporting knowledge acquisition and exchange when managing projects as it '... does not have a proven track record' (Chu Keong &amp; Suliman 2002, p. 55).</p>
<p><b>RC-3</b></p> <p>Organisation culture and politics occur in the physical and virtual space where projects are managed have a direct impact on knowledge acquisition and exchange.</p>	<p><b>RCC-3</b></p> <p>The acquisition and exchange of knowledge may only be temporarily embedded into managing a project and '... decoupled from other past, contemporary, or even future sequences of activities' (Lundin &amp; Söderholm 1995, p. 446).</p>
<p><b>RC-4</b></p> <p>Personality drives instinctive behaviours to acquire and exchange knowledge, which is influenced by the culture of an organisation.</p>	<p><b>RCC-4</b></p> <p>If the acquisition and exchange of knowledge '... is limited to actions that are contingent on rewarding reactions from others' (Blau 1964, p. 6) and the rewards cease, acquiring and exchanging knowledge may be negatively impacted.</p>
<p><b>RC-5</b></p> <p>Inconsistent approaches to the creation of learning opportunities limit the acquisition and exchange of knowledge.</p>	<p>No evident counter claims.</p>

Research Claim	Research Counter Claim
<b>RC-6</b> Qualifications and experience impact on skills and competency when acquiring and exchanging knowledge.	No evident counter claims.

### 5.3 Supporting Evidence

In this section the supporting evidence underpinning the research claims are identified. The evidence is noted initially in terms of the literature reviewed and the data collected and analysed, and any divergence or convergence is identified. A comparison of the literature and the data is divided into four parts. Part One situates the research project management. Part Two investigates how the research participants *acquire* knowledge, and Part Three delves into how the research participants *exchange* knowledge. Part Four examines the project knowledge environment and the drivers underpinning the acquisition and exchange of knowledge. By comparing the literature to the analysed data, it is expected reasoning links will be identified and applied to the relevant theories in a project management context.

The literature underpinning the analysis was reviewed and initially divided into two themes: project management and knowledge exchange, with several sub-categories within each area, refer to Figure 32: Initial Research Framework. The development of data-led categories saw the emergence of a more defined focus in the primary research themes of knowledge acquisition and exchange within the project management context. The re-organisation and expansion of the secondary research area to focus on the environment and drivers required additional literature to be reviewed. The final iteration of the Research Framework is depicted in Figure 33 and is used as the basis for the following discussion which is divided into four parts. Part One examines the project management context; Part Two examines knowledge acquisition; Part Three examines knowledge exchange; and Part Four examines the environment and drivers of knowledge acquisition and exchange. The sequential development and refinement in the focus of the research framework is included in Appendix 1 for reference.

The following Figure 32 depicts the initial development of the research framework.

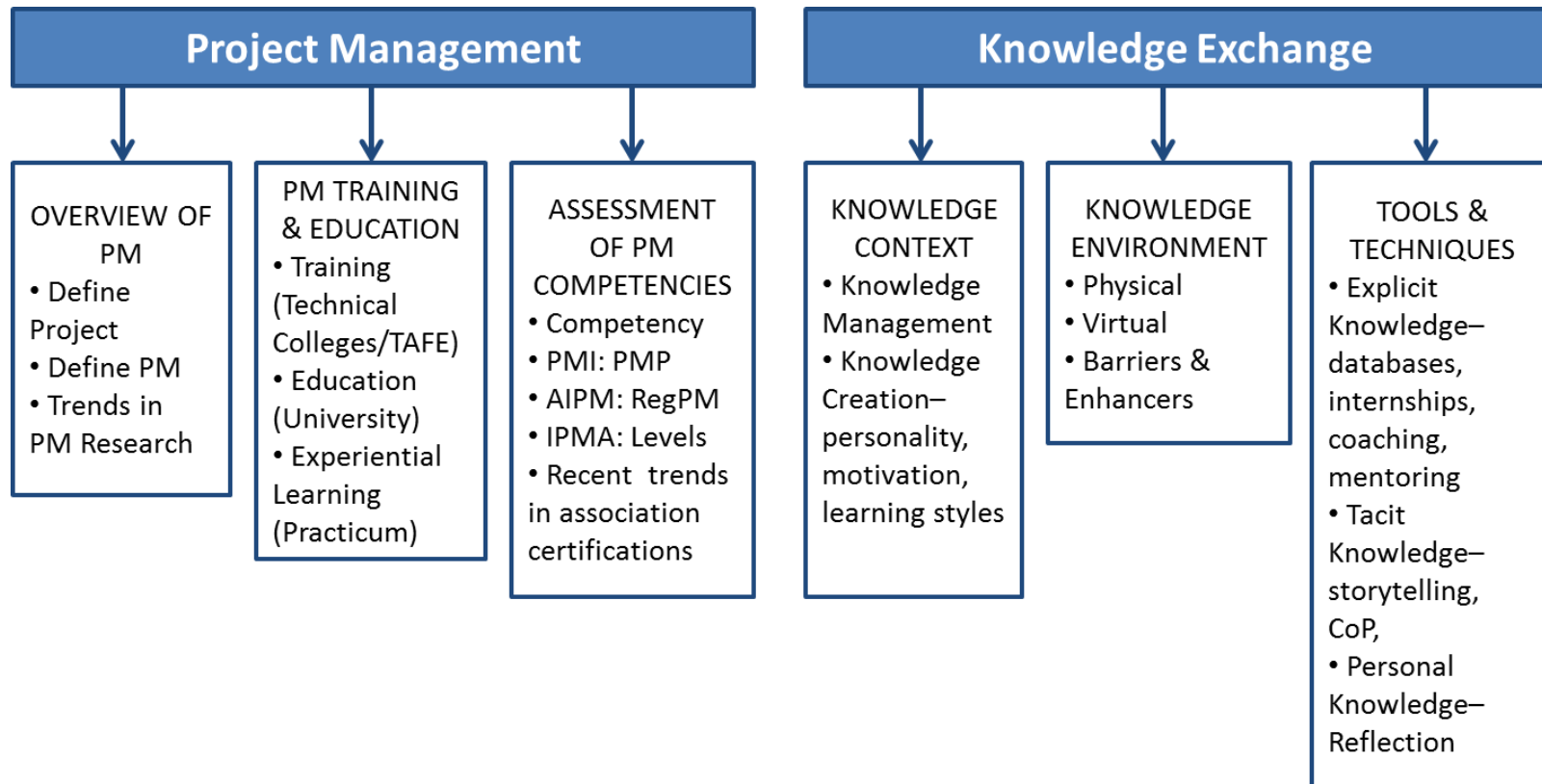


Figure 32: Initial research framework



The following Figure 33 depicts the final research framework divided into four parts to compare against the data and theory.

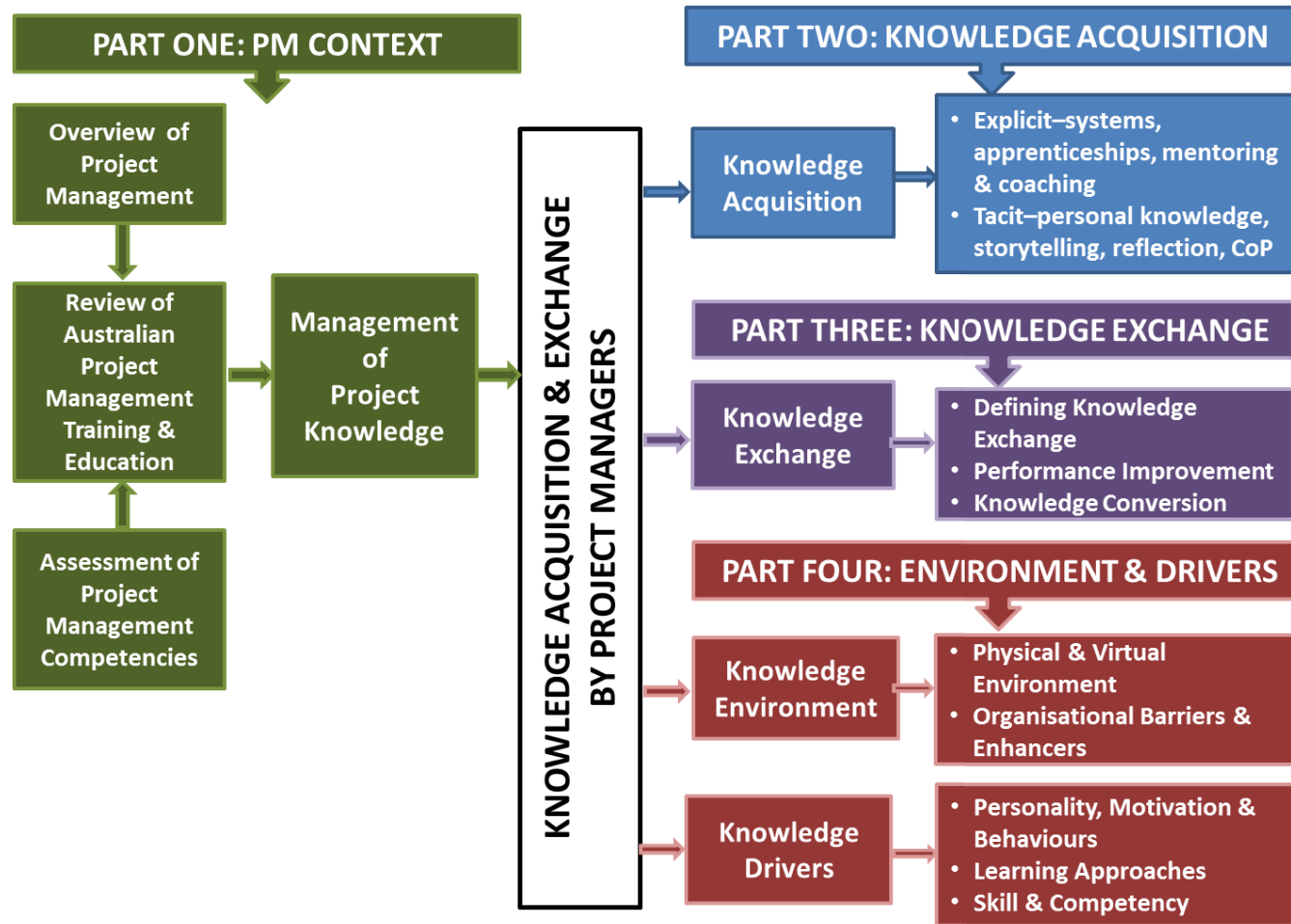


Figure 33: The final research framework

### **5.3.1 Part One: Project Management Context**

The literature review established the context in which the research was conducted. What constitutes project management, the training and education available to aspiring and developing project managers in Australia, and the competencies required of an Australian project manager were explored in the literature. The data collected inferred each research participant had taken an indirect pathway to become educated and experienced in the project management discipline. This will be further outlined in this chapter in 'Section 5.3.2 Part Two: Knowledge Acquisition'.

When exploring the literature, and through my own practice-based and learning experiences as a project manager, it is clear if the Australian perspective of project management is shifting. In the 1950s and 1960s project management in Australia was predominantly used in the military and engineering sectors and was driven by specific techniques adopted from overseas. In the 1970s, 1980s and 1990s these techniques were applied to the mining, agricultural and finance sectors and there was an increased focus on managing projects through alliances and partnerships. In the 21<sup>st</sup> century, Australia is closely aligned to changes occurring internationally, with questions being asked concerning the move from managing projects, to the management of more complex programs and portfolios. Research in the literature about these trends shows considerable attention to the increased need for project managers to engage as reflective practitioners, rather than as technicians, and the need to learn and adapt to increasingly complex project environments. This shift in thinking from technicians using tools to reflective practitioners aligns to the core theme of the 'Rethinking Project Management' research study (Winter et al. 2006). This agenda espouses the technical approach used to manage projects may be developing towards a holistic approach focused on the delivery of value using social practices in projects.

In the traditional sense, managing a project requires a project manager to apply '... knowledge, skills, tools, and techniques to project activities to meet the project requirements' (Project Management Institute 2013, p. 5) within a specified period. To achieve this, the project manager has access to a range of methodologies. I outlined four of the most common approaches to managing a project in 'Chapter 4: Literature Review', 'Section 2.2.1 Overview of Project Management', which are: the Project Management Body of Knowledge, referred to as the PMBOK® Guide (Project Management Institute 2013); Projects IN Controlled Environments

2 (PRINCE2); Logical Framework Approach (LFA); and Agile Project Management. The competencies a project manager needs to develop can begin with a qualification, available in Australia through government and other private organisations at varying vocational levels. These qualifications range from a Certificate to a Bachelor's Degree, or undergraduate degree, through to post graduate Masters and Doctorates in project management. A tertiary qualification is awarded to students for life so they do not need to 're-qualify', unlike a competency assessment which certifies the currency of a project manager's capability for a specified period of time. These certifications are governed by industry associations and align to standards such as the Project Management Institute's PMBOK® Guide (2013) and, or the Australian Qualifications Framework (2010).

The ability of project managers to deliver often ambiguous projects in a changing environment requires them to adopt a flexible approach including various learning-on-the-job opportunities. These can include project based and experiential learning, and mentoring to deepen their knowledge to meet these contemporary challenges. These approaches immerse project managers in environments where opportunities are enhanced to develop more context specific skills and trigger the necessary internal drivers to accelerate performance. The impact of the project environment and learning drivers is discussed in 'Section 5.3.4 Part Four: Knowledge Environment and Drivers' in this chapter.

### **5.3.2 Part Two: Knowledge Acquisition**

Through examining the existing situation in the first action research cycle, the research participants were asked during the first intervention how they acquired project management knowledge. The data indicated they were unlikely to have formal training in project management, having moved into the role of a project manager through practical experience. This transition was assisted through the research participant's work experience throughout their career, combined with their personal growth and the opportunities taken to develop their project management skills. Gaining project management skills varied from either formal roles as project managers, an informal or accidental role working on projects, or unstated or implied project management experiences. The literature supporting the investigation into how the research participants acquired project management knowledge included explicit and tacit approaches. When reviewing the literature suggesting knowledge was acquired explicitly, I looked at formal systems, apprenticeships, coaching and mentoring, and education. I also reviewed how knowledge was acquired through tacit means, such as: relying on the personal knowledge held by an individual; reflection; communities of practice; and storytelling. The

following Table 20 aligns the themes identified in the literature review with the data analysed from the action research interventions to identify convergence and divergence when examining how project managers acquire knowledge. This table does not include a column for divergence, as there was only one area of divergence in my examination of the literature and the data, and this is clearly identified. A detailed table including all literature themes and data convergence and divergence is included in Appendix 2 for reference.

Table 20: Divergence and convergence between the literature and data on knowledge acquisition

Literature Themes	Findings from the <i>Data</i>	<i>Data Converging with the Literature</i>
<p><b>Knowledge Acquisition: <i>Explicit</i></b></p> <p><u>Systems Approach</u></p> <p>Use of intranets, data warehouses, networks.</p>	<p>Research participants intended to utilise established systems and also developed their own systems to locate and store knowledge to use on future projects.</p> <p><i>'It was filed in <b>systems</b> accessible and if you took the time to do it, the archive of lessons learned was there' (Mike).</i></p>	<p>The literature and the data confirm it is beneficial to the acquisition of knowledge to have a system for the orderly repository of explicit knowledge generated from project work. Networks can then be built '... so that people can find each other, [and information]... to facilitate collaboration' (Pfeffer &amp; Sutton 1999, p. 89).</p> <p style="text-align: center;"><b><i>Data Diverging with the Literature</i></b></p> <p>In practice the research participants rarely accessed a formal system to acquire knowledge due to time restrictions and lack of confidence in the knowledge contained in the system.</p>
<p><b>Knowledge Acquisition: <i>Explicit</i></b></p> <p><u>Apprenticeships</u></p> <p>Skills attained on-the-job guided by a master in a controlled environment.</p>	<p>The lack of data from the action research cycles indicated the practice of explicitly acquiring knowledge through <i>formal</i> master-apprentice relationships did not occur with the research participants in the research sample. However, evidence from the observations suggested <i>informal</i> guidance from others occurred on previous project work.</p>	<p>At times, the research participants were observed trying to balance their personal needs with the organisation needs. This may have been assisted by a more structured approach using an apprenticeship framework (Bourne &amp; Walker 2004, p. 239).</p>
<p><b>Knowledge Acquisition: <i>Explicit</i></b></p> <p><u>Coaching and Mentoring</u></p> <p>Formal and informal interactions beyond direct line management to enable explicit learning and</p>	<p>The influence of an informal or formal coach or mentor played a significant role in the development of the research participants. The position the coach or mentor held within the organisation was irrelevant if they gave explicit support and knowledge required in a timely manner.</p>	<p>The literature and the data converge on the value of coaching and mentoring to explicitly acquire knowledge. Mentoring or coaching is '... designed to ... guide the desired behavior change of those involved' (Murray 1991, p. 5). The benefit of the knowledge acquired, whether through formal or informal</p>

Literature Themes	Findings from the <i>Data</i>	<i>Data Converging</i> with the Literature
development to occur.	<i>'One of the things we do quite regularly in my division is <b>coaching</b> project managers and I thoroughly enjoy doing it'</i> (Mike).	programs, has a direct and positive impact on developmental opportunities for research participants.
<p><b>Knowledge Acquisition: <i>Tacit</i></b></p> <p><u>Personal Knowledge</u></p> <p>Knowledge held by an individual that is organised and used to accomplish goals and create new knowledge often 'non-consciously'.</p>	<p>The ability for the research participants to recognise how they acquired and used tacit knowledge to manage projects was difficult for them to explain. They understand and recognise the value of personal knowledge, even when not fully aware of how it was acquired.</p> <p><i>'A lot of it is common sense and sometimes we do it <b>intuitively</b> but we sometimes need reminders'</i> (Lima).</p>	<p>The literature presents a clear description of personal knowledge not directly evident in the data as it '... is the least accessible but most complete form of knowledge' (Dalkir 2005, p. 64). This was due to the nature of tacit knowledge being known often only to the research participant.</p>
<p><b>Knowledge Acquisition: <i>Tacit</i></b></p> <p><u>Storytelling</u></p> <p>Social exchange or narrative to clarify meanings by sharing knowledge between people with the possible intention of eliciting an outcome.</p>	<p>The research participants created opportunities to embed lessons and generate new knowledge through sharing experiences in the form of stories. The stories have purpose relevant to a specific situation or context.</p> <p><i>'You go out on site and invariably somebody will tell a <b>story</b> about ... what we did and there's all those sharing of those <b>stories</b> ... but they're not just telling stories for that sake. It's really related to something that's going on and usually there's a lesson out of it that you can apply'</i> (Delta).</p>	<p>The verbal or written narrative to deliver a message in the form of stories aligns to the literature and the data. The purposeful role of the storyteller offers '... a detailed explanation of the cause-and-effect relationship between an action and its consequence' (Denning 2006, p. 45) can '... generate and disseminate knowledge' (Laufer &amp; Hoffman 2000, p. xvi).</p>

Literature Themes	Findings from the <i>Data</i>	<i>Data Converging with the Literature</i>
<p><b>Knowledge Acquisition: <i>Tacit</i></b></p> <p><u>Reflection</u></p> <p>Social collaboration to embed knowledge through reflection can illuminate pathways not considered. This external trigger can be used to identify priorities and make sense of knowledge based on past experiences.</p>	<p>Research participants understood reflection could improve the management of projects. However, there existed a random approach to bringing individual reflections from previous experiences to current project/s. There were formal structures built into project plans to review progress on current project, with an expectation individuals would apply relevant lessons learnt from past experiences.</p> <p><i>'It [reflection] helped me to see the difficulties and the issues and the problems and then learn from those' (Delta).</i></p>	<p>The benefit of reflection is confirmed between the literature and the data where the research participants '... extract cues and make plausible sense retrospectively, while enacting more or less order into those ongoing circumstances' (Weick &amp; Sutcliffe 2005, p. 409). Reflection offers a valuable tool if used explicitly, respecting the informal way individuals reflect. The value of reflection extends to socialising relevant experiences beyond the confines of the current project.</p>
<p><b>Knowledge Acquisition: <i>Tacit</i></b></p> <p><u>Communities of Practice</u></p> <p>A structured group with shared expertise, identity, and purpose where individuals gain skills through social interactions and abide by agreed guidelines.</p>	<p>The research participants used both informal and formal groups aligned to their project or their role in an organisation. There was less interest in joining external communities, such as discipline-specific groups, unless a direct benefit is seen to their current work and future career.</p> <p><i>'There's a [internal] young professionals network set up. We try and get people together to share their experiences' (Whiskey).</i></p>	<p>The literature offers clear guidelines and benefits to creating and sustaining communities of practice which is reflected in the data. Communities of practice create '... shared identity, foster commitment/obligation and codependence and support social interaction' (Hall 2001, p. 15). In the workplace however, with pressures to meet project deadlines and client needs, the research participants have little opportunity to engage in external groups, unless a clear and direct benefit is identified. Often a community of practice is established around a current project and dissolves when the focus has changed, unless formally established within, or external to, the organisation.</p>

To understand the explicit acquisition of knowledge, the literature was divided into the systems people use, apprenticeships, education, and coaching and mentoring. The data collected during the action research cycles suggests most of these explicit practices converge with the literature, although not in regard to apprenticeships and the use of formal systems to acquire knowledge. The lack of data on apprenticeships may be the result of the lack of formal programs in the project management sector, with all research participants suggesting mentors assisted at various points in their career with their acquisition of knowledge. A lack of time and credibility of the data stored in a formal system was an inhibitor for the research participants to utilise or store information while managing their projects.

The tacit acquisition of knowledge was reviewed against personal knowledge, storytelling, reflection, and communities of practice. The data only diverged from the literature when I was unable to elicit the nature of personal knowledge from the research participants. They referred to instinct and intuition as their non-conscious knowledge, although the act of asking the research participants to describe personal knowledge brought awareness of this knowledge to a conscious level was often difficult to describe. The literature and data converged with the other areas of investigation with varying levels of alignment. This variation was the result of the research participants using different terms to describe reflection and communities of practice.

### **5.3.3 Part Three: Knowledge Exchange**

To investigate how project managers exchange knowledge I used several interventions to collect data directly from the research participants, as outlined in 'Chapter 3: Research Methodology and Methods'. The data was collected through interviews, observations, third party feedback, a focus group, and reflective journals. The data collected from the interviews with research participants indicated through the coding of the data where, in the majority of cases, they exchanged knowledge in a formal and impersonal manner. This was confirmed as the primary approach when observing the exchange of knowledge across all roles in the research participants' workplaces. I observed they maintained this manner when the exchange was planned, although when it was impromptu, the exchange with senior managers was more personal. The research participant's selected their own work colleagues who were interviewed on their perception of how the research participant exchanged knowledge. Their recollections of the research participant however differed, as they suggested the exchanges were, in



general, less formal. There were minor variations in each case which have been outlined in detail in 'Chapter 4: Data Collection and Analysis'.

When reviewing the impact of the knowledge exchange instrument, I found the research participants used this tool predominantly to plan an exchange. The tool was thought about, but not actually used during an exchange, and was sometimes used to reflect on ways to improve the exchange after it had occurred. It was interesting all but one of the research participants suggested they would modify the knowledge exchange instrument to suit their specific environments.

The insights I drew from the first reflective journal completed by the research participants were focused on how they exchanged knowledge, and in some cases what occurred as a result of an exchange. The research participants all reflected on different aspects of their work and interactions to improve outcomes for the organisation, the project or the project team. The research participants completed a second reflective journal while they were implementing the Knowledge Exchange Tool with again several interesting insights. These insights included the tactical application of the tool when working on different projects to prepare for and review exchanges, and the personal observations of this changed approach.

The following Table 21 aligns the themes identified in the literature review with the data analysed from the action research interventions to identify the divergence and convergence when examining how project managers exchange knowledge. The previous Table 20 examines literature themes and research data compared to knowledge acquisition, where Table 21 below compares literature themes and research data to knowledge exchange. A detailed table including all literature themes and data convergence and divergence is included in Appendix 3 for reference.

Table 21: Divergence and convergence between the literature and data on knowledge exchange

Literature Themes	Findings from the <i>Data</i>	<i>Data Converging</i> with the Literature	<i>Data Diverging</i> from the Literature
<p><b>Knowledge Exchange</b></p> <p><u>Knowledge Exchange</u></p> <p>The deliberate interaction between decision makers and other individuals or groups of people who are working together to achieve an outcome. It is considered to be a social process where various contingent histories, professional perspectives, and local conditions interact in a systematic, mutual way to share tacit knowledge in order for it to convert to explicit knowledge.</p>	<p>Research participants understood the value of exchanging knowledge to ascertain what was, and what had been, occurring on a project in order to progress their work. The ability to engage in formal and informal exchanges allowed them to connect with stakeholders and share tacit and explicit knowledge. Some of the most valuable exchanges generated insights into negative outcomes so lessons can be captured for future projects.</p> <p><i>'It was termed a lessons learned review but one of the critical things about it was about <b>knowledge exchange</b>' (Whiskey).</i></p>	<p>The data converges with the literature in the requirement for key people engaged with the project to deliberately exchange knowledge as it is a '... powerful way to share, replicate, and scale up what works in development' (Kumar &amp; Leonard 2011, p. 1). The data also supports the literature where social interaction occurs for knowledge to be exchanged in a mutually beneficial and systematic manner in order to achieve a desirable outcome.</p>	<p>It is when these exchanges are unplanned the data differs from the literature as '... there are very few descriptions of how knowledge exchange unfolds in practice' (Ward et al. 2012, p. 2). These <i>ad hoc</i> interactions occurring in practice may produce beneficial outcomes.</p>

Literature Themes	Findings from the <i>Data</i>	<i>Data Converging</i> with the Literature	<i>Data Diverging</i> from the Literature
<p><b>Knowledge Exchange</b></p> <p><u><i>Performance Improvement</i></u></p> <p>The exchange of knowledge can lead to demonstrated success (O'Dell &amp; Jackson Grayson 1998) and enhanced performance (Hall 2001) through full and open knowledge exchange, particularly prior to staff turnover.</p>	<p>There was a desire by the research participants to improve performance through the active exchange of knowledge. There was frustration amongst those responsible for delivering projects where interference or loss of knowledge can hinder the outcomes being delivered.</p> <p><i>'... bringing together our knowledge around the <b>improvements</b> which we could do and how we could change things and formalise things' (Sierra).</i></p> <p><i>'If we were actually conscious of how information and knowledge moved around the organisation, [it] would help the <b>performance</b> of the organisation' (Whiskey).</i></p>	<p>The data and literature confirm there is a compelling body of evidence to demonstrate exchanging knowledge leads to demonstrated success. O'Dell and Jackson Grayson (1998, pp. 158-9) suggest knowledge exchange leads to: a compelling call to action; demonstrated success ... and recognition of the potential gain.</p> <p>To improve the responsiveness of those in a position to exchange knowledge, a structured approach can be adopted to create a benchmark for success.</p>	<p>No divergence evident in the literature reviewed.</p>

To understand the concept and application of knowledge exchange, the literature was divided into reviewing what knowledge exchange is, the potential for performance improvements from knowledge exchange, and the conversion of knowledge after exchange. The data collected during the action research cycles suggests the research participants understand the impact on performance of exchanging knowledge although is confused about the term knowledge exchange. When comparing the data to the literature it is interesting to note the research participants did not refer to the verb exchange, but instead used the terms to share or transfer knowledge, even when the verbal and written instructions only used the term exchange. This raises the question as to whether there was an issue in the translation of the meaning, or whether the research participants had different views and definitions of the terms according to the context. The data was supported in all areas to varying degrees by the literature which describes the need for knowledge exchange to occur socially yet in a systematic manner for beneficial outcomes to occur.

The data indicated the manner of exchange of knowledge is predominantly conducted in what I termed an impersonal and formal way, with the literature suggesting successful project delivery is linked to the adoption of formal knowledge exchange approaches. When these approaches are not adopted, such as when unplanned interactions and partial or no exchange of knowledge occurs, the result is frustration and an increased potential for failure. However, the research participants' colleagues had a view the research participants were less formal than I observed. This could relate to how the work colleagues were supposed to act, with an implicit understanding this was an appropriate approach and may achieve improved results through the team. The disconnect between my observations and the conduct observed by the work colleagues raise questions as to whether this tendency towards using a formal approach to exchange knowledge may lead to problems. An opposing assumption may be the informal manner used to exchange knowledge in specific circumstances may lead to missed opportunities due to using an unstructured approach. The measure of success or failure is only represented in the literature, in particular the act of converting knowledge. Knowledge conversion was outside the scope of the study as the data focuses on the act of knowledge exchange, not what occurred to the knowledge during or after the exchange which may lead to success or failure.

### 5.3.4 Part Four: Knowledge Environment and Drivers

Underpinning the ability of the project manager to acquire and exchange knowledge is the ability of their workplace to deliver projects, and the drivers focusing attention in this domain. These areas are described as the external environmental impacts, such as the physical and virtual environment, and the barriers and enhancers within an organisational context. The internal impacts related directly to individual personality, motivation and behaviours, learning approaches, and skill and competency.

In action research cycle 1, I examined the existing situation through two interventions, being one-on-one interviews and at a later date *in situ* observations. In the first intervention the research participants were specifically asked in an interview to comment on the impact of organisational culture on exchanging knowledge and how behaviours impacted knowledge exchange. The observations I made in the second intervention included what type of environment the research participants were exchanging knowledge in, and what I observed to be the driving forces behind how they approached acquiring and exchanging knowledge. The data and my own reflections on the environment in which the research participants worked and the underpinning drivers were captured in my observation notes and informed the analysis of the data.

The following Table 22 aligns the themes identified in the literature review with the data analysed from the interventions to identify the divergence and convergence when examining the project management knowledge environment and the drivers to acquire and exchange knowledge. A detailed table including all literature themes and data convergence and divergence is included in Appendix 4 for reference.

Table 22: Divergence and convergence between the literature and data on knowledge environment and drivers

Literature Themes	Findings from the <i>Data</i>	<i>Data Converging</i> with the Literature	<i>Data Diverging</i> from the Literature
<p><b>Knowledge Environment</b></p> <p><u>Physical Environment</u></p> <p>Temporary physical environments influence the individual who needs to be aware of specific nuances.</p> <p><u>Virtual Environment</u></p> <p>Facilitate a systematic approach to project work through the use of technology.</p>	<p>I captured a range of approaches used in the project environments to meet the specific goals of the project through interviews and observations. The research participants used the reflective journals to capture their reflections on the impact of the environment on their project work.</p> <p><i>'I also try and talk to people outside of the project, just to get a feel for either getting background information or a feel for the <b>political environment</b>' (Lima).</i></p>	<p>Clearly established protocols and managing expectations applies to both the physical and virtual environments where the individual '... influences and is influenced by the environment ... with which he or she interacts' (Nonaka, Toyama &amp; Konno 2000, p. 8). The data supported the literature in the creation of a space to exchange knowledge; however there was no specific literature found to support the <i>ad hoc</i> interactions I observed.</p>	<p>The data diverged from the literature as the research participants established their physical and virtual project environments in a reactive manner due to external pressures being technical and/or political. As a result the research participants were unable to '... supply support and scaffolding for learning and reflection within the authentic, real world contexts in which knowledge construction naturally occurs' (Lee &amp; McLoughlin 2007, p. 23).</p>
<p><b>Knowledge Environment</b></p> <p><u>Organisational Barriers</u></p> <p>Lack of support; not understanding the value of knowledge; ignorance; absorptive capacity; no relationship between key parties.</p>	<p>The research participants were not specifically asked what enabled or hindered the acquisition and exchange of knowledge. However, they suggested what the barriers were, and I observed how they managed to mitigate these and put in place processes to enhance knowledge</p>	<p>There was a strong convergence between what the literature identified as barriers to knowledge acquisition and exchange, and how best to mitigate and manage these in practice. The data reinforced these barriers faced by the research participants in their organisations, which included lack of support and leadership, and lack of, or incorrect, knowledge leading to</p>	<p>No divergence evident in the literature reviewed.</p>

Literature Themes	Findings from the <i>Data</i>	Data <i>Converging</i> with the Literature	Data <i>Diverging</i> from the Literature
<p><u>Organisational Enhancers</u></p> <p>'... technology, culture, leadership, and measurement' (O'Dell &amp; Jackson Grayson 1998, p. 163).</p>	<p>acquisition and exchange.</p> <p><i>'It's just a bit of a <b>roadblock</b> as well. It stops you kind of progressing. It just stalls you unnecessarily' (Sierra).</i></p> <p><i>'...what we might be able to do to eliminate <b>barriers</b>' (Whiskey).</i></p>	<p>misunderstandings. Also, one of the '...biggest impediments... was culture' (Ruggles 1998, p. 86).</p>	
<p><b>Knowledge Drivers</b></p> <p><u>Personality</u></p> <p>How a person will make choices based on their awareness and perception.</p> <p><u>Motivation</u></p> <p>Defines people by their drive to reach their full potential using rewards and recognition.</p> <p><u>Behaviour</u></p> <p>Factors motivating individuals and groups to act in a specified way to influence, control and alter.</p>	<p>The research participants were able to articulate what drove them to acquire and exchange knowledge, with the less forthcoming or unconscious drivers noted during interviews and observations. Multiple data sources corroborated the analysis.</p> <p><i>'They were very much focused on <b>behaviours</b> and signs of behaviour and influencing behaviour' (Mike).</i></p> <p><i>'The biggest influence on the <b>behaviours</b> of individuals is the team leader' (Whiskey).</i></p>	<p>The behaviour of each research participant demonstrated a strong convergence with the literature on how knowledge exchange is influenced by '... a knowledge-intensive culture' (Cohen 1998, p. 27). The ability for personality to instinctively drive knowledge acquisition and exchange supports the literature in terms of the project manager making instinctive decisions (Lehrer 2009).</p>	<p>Managing organisational culture was addressed in the literature from the perspective of the team member, not as the data suggested in terms of the project manager who assumed leadership. 'Leaders in an organisation, specially the new comers, should know the organisational culture, boundaries and understand what are the rewards or consequences' (Dess, Lumpkin &amp; Eisner 2010, p. 317).</p>

Literature Themes	Findings from the <i>Data</i>	Data <i>Converging</i> with the Literature	Data <i>Diverging</i> from the Literature
<p><b>Knowledge Drivers</b></p> <p><u>Learning Styles</u></p> <p>Used to determine learning preferences individuals apply to achieve enhanced outcomes.</p> <p><u>Experiential Learning</u></p> <p>Learning occurs in an ongoing cyclical way to form new ideas through experiences.</p> <p><u>Social Learning</u></p> <p>Learning how to behave from observing others. This can contribute to retention of individual and group knowledge.</p>	<p>The data did not present structured learning approaches adopted by the research participants, but instead <i>ad hoc</i> learning opportunities arose when managing projects.</p> <p><i>‘Continuing to <b>ask questions</b> and poke at this from different angles until you come up with your self-discovery’ (Mike).</i></p> <p><i>‘Then <b>learned</b> over time as I did more of the managerial pieces to refine my organisational skills around it’ (Mike).</i></p>	<p>The learning approaches identified in the literature were represented in the data when the research participants explained how they acquired some of their knowledge. This was in the form of a continuous process involving transactions between the person and the environment (Kolb 1984, pp. 26-37) to create knowledge.</p>	<p>The apparent <i>ad hoc</i> approach adopted by the research participants to acquire and exchange knowledge was not evident in the literature. However, the research participants could be ‘... modeling [sic]: from observing others one forms an idea of how new behaviors are performed, and on later occasions this coded information serves as a guide for action’ (Bandura 1977, p. 22).</p>



Literature Themes	Findings from the <i>Data</i>	<i>Data Converging</i> with the Literature	<i>Data Diverging</i> from the Literature
<p><b>Knowledge Drivers</b></p> <p><u>Skill and Competency</u></p> <p>The link between skill, or an ability, and competency, a standard to measure skill against.</p>	<p>The data indicated the research participants may not have understood the subtle difference between skill and competency, although they saw a definite link between skill and the knowledge required to work on their projects.</p> <p><i>‘The engineering <b>skills</b> that were required and a desire to have people who were more capable of project management’ (Whiskey).</i></p>	<p>Skills generally represent an individual’s ability to work on required tasks against agreed measures of competency. Four phases of competency described by Flower (1999, p. 64) can be seen in the data as the research participants explained their own development in similar stages. These stages included moving from an unconsciously unskilled ‘Spectator’, to a consciously unskilled ‘Student’, to a consciously skilled ‘Facilitator’, and finally to an unconsciously skilled ‘Leader’.</p>	<p>Although the data did not directly refer to competency as defined in the literature, it was inferred competency was represented in the qualifications and experiences required to undertake the work within specific standards. Competencies are ‘... individual and measurable skills demonstrated and assessed against agreed standards of competence’ (Cairns 2000, p. 2). These standards describe ‘... performance criteria for workplace performance’ (Crawford et al. 2006, p. 723).</p>

The literature supported the outcomes of the data analysis when investigating the physical and virtual environment in which knowledge is acquired and exchanged in several areas. These supported areas include where the research participants created flexible spaces to share an understanding of the impact of culture and politics on their work with those involved in the project. However, the research participants felt they had little influence over what type of environment they could create for their projects which formed a barrier to knowledge acquisition and exchange. The data also aligned to the literature in regard to some major barriers to knowledge acquisition and exchange. These barriers included the lack of organisational support and leadership, and lack of knowledge leading to misunderstandings. The data diverged from the literature where in practice the research participants established their physical and virtual project environments in a reactive manner due to external technical or political pressures.

The drivers behind knowledge acquisition and exchange were divided into three areas: 1. Personality, Motivation, and Behaviours; 2. Learning Styles and Experiential Learning; and 3. Skill and Competency. The data supported the literature where the research participant's personality underpinned instinctive behaviours to acquire and exchange knowledge and their behaviour was influenced by the culture of the organisation. Project management skills and competency gained in the workplace impacts knowledge acquisition and exchange. The data suggested this was represented through a combination of the research participant's qualifications and experience. There was a mixed outcome when reviewing the impact learning approaches had on the acquisition and exchange of knowledge. The data indicates the research participants create learning opportunities; however they are not willing to invest the time in doing this in a consistent and formal way as suggested in the literature.

#### **5.4 *Theoretical Framework***

The research is planned to confirm and extend existing theory relating to knowledge acquisition and exchange, and the behaviours underpinning these actions by presenting '... a coherent group of general propositions used as principles of explanation for a class of phenomena' (The Macquarie Dictionary 2009, p. 1708) within the project management context. The research does not aim to test a theory, to confirm its validity, or to analyse data against probabilities, so would not be described as deductive or probabilistic. This research follows the inductive approach where the research was '... inventing explanations about things. Not finding them – that's truth; inventing them ...' (Mintzberg 2005, p. 357) to generate a

deeper understanding of relevant theories. Through this deeper understanding, and in some cases an extension of theory, the researcher can make ‘... assumptions about motivations or intentions’ (Runeson 1999, p. 40) to infer the selected theories apply. ‘This method of testing through inferences is called *adduction*, and is sometimes the only way in which some theories may be verified empirically’ (Runeson 1999, p. 40). The process involved in the systematic collection and analysis of the data is to examine, confirm and extend relevant theories, as depicted in Figure 34 below.

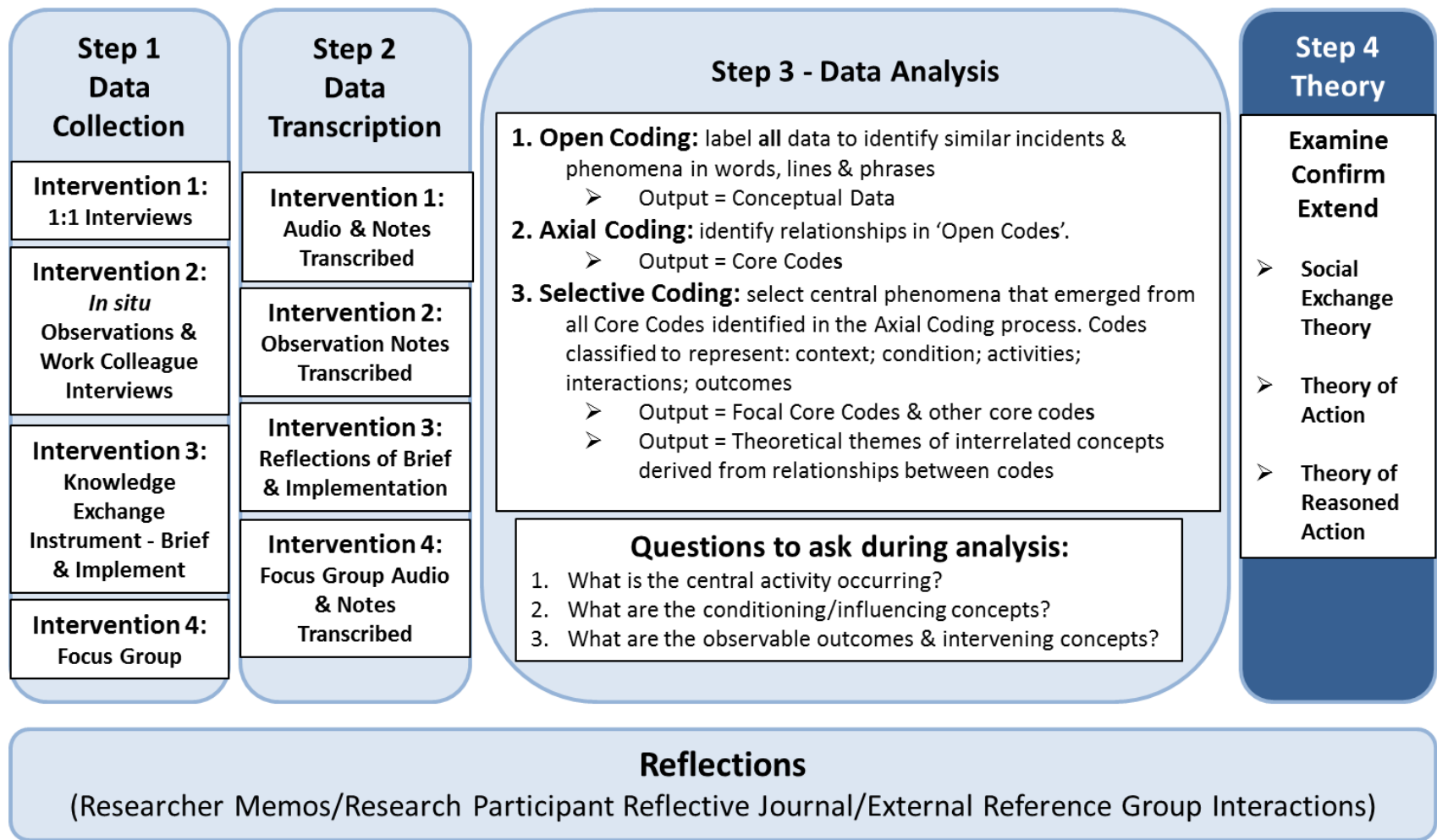


Figure 34: Theory examination, confirmation and extension—step 4

To support the research, a theoretical framework was informed by three core theories from reviewing the literature on knowledge acquisition and exchange by individuals. These theories relate to social exchange, action, and reasoned action. Additional theories were examined but considered outside of the individual focus of the study, and included the theory of planned behaviour, organisational theory, theory of knowledge, and change management theory. A description of the three theories is included in the following section.

### **5.4.1 Social Exchange Theory**

The basis of Social Exchange Theory (SET) is the exchange of a tangible or intangible resource at the lowest cost, in terms of money, time and other resources, after evaluating alternative courses of action. The formation of human relationships is based on a subjective cost-benefit analysis of alternatives negotiated between parties. The necessary components required to undertake an exchange include actors, being individuals or groups, and resources, of tangible and intangible value. The exchange process, once initiated, results in a negotiated or reciprocal transaction where several parties exchange a tangible or intangible asset. In each transaction, the nature of the relationship needs to be clarified so as to understand if it is based on a '... series of interdependent exchanges ... or the interpersonal attachments *that result* from a series of interdependent exchanges' (Cropanzano & Mitchell 2005, p. 886 original italics). The structure of the exchange as presented by Molm (2001, p. 261) can either be a direct approach in a dyadic or network; indirect approach through a generalized exchange; or in a productive exchange.

Early observations by Homans (1958) who, after studying elementary social behaviour in small groups adopted '... the view that interaction between persons is an exchange of goods, material and non-material' (Homans 1958, p. 597). 'Social exchange as here conceived as limited to actions that are contingent on rewarding reactions from others and that cease when these expected reactions are not forthcoming' (Blau 1964, p. 6). The examination of social exchange at a micro level continued with the work done by Emerson (1976)

*'... to honor the integrity of the social relation as a unit of analysis. To make this point as clear as possible, consider three different units of empirical observation: actions or decisions by individuals; transactions between individuals; and exchange relations as series of transactions between the same individuals' (Emerson 1976, pp. 345-6).*

At a macro level, Emerson (1976) suggests that social interactions form a unit of analysis when they occur between multiple parties at a group and individual level .

The foundations of social exchange theory are extended with the following concepts presented by Molm (2001):

- Power-dependence Relations: relying on others can create a power imbalance leading to conflict. This can be minimised through the formation of coalitions who rectify the imbalance through fair exchanges. However, to manage reputations the people involved may consciously use power to reach an agreement. In reciprocating an exchange, Molm (2001) suggests '... both reward power and coercive power are derived from dependence on others, either by obtaining rewards or avoiding punishment' (2001, p. 265).
- Resistance Theory: beliefs and the position of power held by the people involved in an exchange can impact their current negotiations, and potentially any future exchanges.
- Risk: uncertain situations require, and can result in, an increased level of trust. A high level of trust can facilitate a fair exchange, and if not present the stability of the network is threatened.

The practical issue of integrating Social Exchange Theory is based on '... work that alludes to social exchange theory, yet does not treat information or knowledge sharing as one [of] its main themes, may still touch on these aspects' (Hall 2001, p. 4).

The following Table 23 presents an overview of where the literature and data converge with Social Exchange Theory, and where this theory has been confirmed or may be extended as a result of this review. A detailed table including all literature themes and data convergence and divergence with Social Exchange Theory is included in Appendix 5 for reference.

Table 23: Divergence and convergence between social exchange theory, the literature and data

Data <i>Converging</i> with the Literature	Data <i>Diverging</i> with the Literature	Convergence of Literature and Data with Social Exchange Theory (SET)	Can the Theory be <i>Confirmed</i> or <i>Extended</i> ?
<p><b>Knowledge Acquisition: <i>Tacit</i></b></p> <p><u>Communities of Practice</u>: benefit to a current project, dissolved when focus changes, unless formally established within or external to the organisation.</p> <p><i>‘There’s a [internal] young professionals <b>network</b> set up. We try and get people together to share their experiences’ (Whiskey).</i></p>	<p>No divergence observed.</p>	<p>SET can occur in a direct or indirect network ‘... involving many actors, both corporate groups and individuals’ (Emerson 1976, p. 359) coming together to balance the exchanges.</p> <p>Application to CoP in project management could <b>extend</b> the theory into a discipline where these networks exist.</p>	<p><b>Extend</b></p> <p>The formation of communities of practice to exchange tacit knowledge among individuals from a direct or indirect network of influence using tangible and intangible assets.</p>
<p><b>Knowledge Exchange</b></p> <p><u>Knowledge Exchange</u>: key people engage with the project to deliberately and systematically exchange knowledge, often in a social interaction.</p> <p><i>‘Information <b>shared</b> is better than information retained’ (Whiskey).</i></p>	<p><i>Ad hoc</i> interactions leading to beneficial outcomes not addressed in literature.</p>	<p>Negotiated reciprocal transaction of tangible or intangible assets between parties.</p>	<p><b>Confirm</b></p> <p>Social, or tacit, exchange of tangible assets in a systematic way.</p>
<p><b>Knowledge Environment</b></p> <p><u>Organisational Barriers</u>: include lack of support and leadership, misunderstandings from lack of knowledge, and</p>	<p>No divergence observed.</p>	<p>Power-dependence relations may ‘... create inequalities...that can lead to conflict and</p>	<p><b>Confirm</b></p> <p>Conflict evident in relationships can create a barrier to knowledge</p>

Data <i>Converging</i> with the Literature	Data <i>Diverging</i> with the Literature	<i>Convergence</i> of Literature and Data with Social Exchange Theory (SET)	Can the Theory be <i>Confirmed</i> or <i>Extended</i> ?
<p>organisational culture.</p> <p><i>'It's just a bit of a <b>roadblock</b> as well. It stops you kind of progressing. It just stalls you unnecessarily'</i> (Sierra).</p>		social change' (Molm 2001, p. 262).	exchange.
<p><b>Knowledge Environment</b></p> <p><u>Organisational Enhancers</u>: created through a common purpose, valuing knowledge sharing, creating opportunities for contact, recognising and capturing tacit knowledge, and building into work practices.</p> <p><i>'Out of this influence at an organisational level how we might <b>not create barriers</b> to knowledge exchange. I'm not going as far as thinking about what might positively encourage it, but what we might be able to do to eliminate barriers'</i> (Whiskey).</p>	No divergence observed.	'... patterns of dependence provide the structural foundation ... [to] ... bring people together' (Molm 2001, p. 262). High level of trust promoted where '... exchange [occurs] under risk and uncertainty' (Molm 2001, p. 268).	<p><b>Confirm</b></p> <p>Inter-group dependency and trust enables knowledge exchange to occur.</p>
<p><b>Knowledge Drivers</b></p> <p><u>Personality, Motivation and Behaviours</u>: influenced by organisational culture, instinct, leadership, and team dynamics.</p> <p><i>'They were very much focused on <b>behaviours</b> and signs of behaviour and influencing behaviour'</i> (Mike).</p>	No divergence observed.	Exchange requires '... dependence on others, either by obtaining rewards or avoiding punishment' (Molm 2001, p. 265). Lawler (1992) suggests there is a conscious use of power tactics when deciding how an agreement will be reached.	<p><b>Confirm</b></p> <p>Motivation to exchange knowledge depends on the behaviour of an individual and the impact of group dynamics.</p>



## 5.4.2 Theory of Action

Two views of the Theory of Action (ToA) have been proposed by Argyris (1995), 'One was the theory that individuals espoused and that comprised their beliefs, attitudes, and values. The second was their theory-in-use—the theory that they actually employed' (1995, p. 20). The way an organisation changes over time through learning processes has been identified by Klev and Levin (2012) as a 'Theory of Action', and extends the linkages made by Argyris and Schön (1978, 1996) between thought and action.

*'Action theories in the form of basic assumptions and established action strategies define and explain the activity in an organization ... action theories at individual and organizational levels are a way of describing the organization as it is shaped and changed by learning processes over time' (Klev & Levin 2012, p. 25).*

The development of a social reality to manage work within the organisational reality requires individuals to understand '... actual practices and not their formal descriptions ... guiding focus, decisions, norms, expectations, understanding of procedures, technology, and so on.' (Klev & Levin 2012, p. 84). However, as observed by Argyris (1995) 'The behaviour of individuals varied widely, but the theory they used to design and implement the behaviour did not vary' (1995, p. 21). The basis of action at a local level can be extrapolated to the organisational level when applying collective theories in action, or 'theory-in-use'. This would require a clear understanding of the way in which work is organised by the same collective to '... produce new understanding and solutions' (Klev & Levin 2012, p. 87). These solutions imply organisational learning has occurred, and may have generated '... negative and positive reactions' (Klev & Levin 2012, p. 86). In these deliberations '... the individual is key to organizational learning because it is the thinking and acting of individual practitioners that produces learning' (Argyris 1995, p. 26).

The following Table 24 presents an overview of the where the literature and data converge with the Theory of Action, and where this theory has been confirmed or may be extended as a result of this review. A detailed table including all literature themes and data convergence and divergence with the Theory of Action is included in Appendix 6 for reference.

Table 24: Divergence and convergence between the theory of action, the literature and data

Data <i>Converging</i> with the Literature	Data <i>Diverging</i> from the Literature	<i>Convergence</i> of Literature and Data with Theory of Action	Can the Theory be <i>Confirmed</i> or <i>Extended</i> ?
<p><b>Knowledge Exchange</b></p> <p><u>Knowledge Exchange</u>: key people engage with the project to deliberately and systematically exchange knowledge, often in a social interaction.</p> <p><i>'I've <b>shared</b> the information and hung out the dirty linen. Which you should do on bad projects' (Bravo).</i></p>	<p><i>Ad hoc</i> interactions represented in the data leading to beneficial outcomes are not evident in literature.</p>	<p>The development of a social reality to manage work within the organisational reality requires individuals to understand '... actual practices and not their formal descriptions' (Klev &amp; Levin 2012, p. 84).</p>	<p><b>Confirm</b></p> <p>Actual practice of knowledge exchange occurs in a social context.</p>
<p><b>Knowledge Environment</b></p> <p><u>Physical and Virtual Environments</u>: require established protocols to manage expectations. Create informal environments to understand cultural and political impacts, although minimal influence over what type of environment can be created.</p> <p><i>'It was a <b>conversation over lunch</b> where you really got the whole story, the big picture and what really went on' (Delta).</i></p>	<p>Literature not identified to link to project environments being created reactively due to external technical or political pressures.</p>	<p>'... the organization [...] is shaped and changed by learning processes over time' (Klev &amp; Levin 2012, p. 25) indicating reactive changes identified in the literature and observed in the research participants practice.</p>	<p><b>Confirm</b></p> <p>Organisations react to change which results in a different environment emerging for appropriate project work to be undertaken.</p>

Data <i>Converging</i> with the Literature	Data <i>Diverging</i> from the Literature	<i>Convergence</i> of Literature and Data with Theory of Action	Can the Theory be <i>Confirmed</i> or <i>Extended</i> ?
<p><b>Knowledge Drivers</b></p> <p><u>Personality, Motivation and Behaviours</u>: influenced by organisational culture, instinct, leadership, and team dynamics.</p> <p><i>'Being able to adjust your <b>behaviour</b> and your communications and having the balls to make decisions and take a risk' (Bravo).</i></p>	<p>No divergence observed.</p>	<p>The research participants behaved differently when exchanging knowledge due to the range of backgrounds. However, '... the behaviour of individuals varied widely, but the theory they used to design and implement the behaviour did not vary' (Argyris 1995, p. 21).</p>	<p><b>Extend</b></p> <p>Applying the ToA's behavioural criteria to project managers could <b>extend</b> the theory based on the difference in their behaviour at various times when managing projects.</p>
<p><b>Knowledge Drivers</b></p> <p><u>Learning Styles, Experiential and Social Learning</u>: learn through experience and observations.</p> <p><i>'Continuing to <b>ask questions</b> and poke at this from different angles until you come up with your self-discovery' (Mike).</i></p>	<p>The research participants did not exploit learning opportunities.</p>	<p>The data and literature suggest '... the individual is key to organizational learning because it is the thinking and acting of individual practitioners that produces learning' (Argyris 1995, p. 26).</p>	<p><b>Confirm</b></p> <p>Project managers have the opportunity to learn through experiences and observations which in turn leads to organisational learning.</p>

### 5.4.3 The Theory of Reasoned Action

The Theory of Reasoned Action (ToRA) offers a framework to predict behavioural intention as a result of both individual and normative influences, on a basis where ‘... human beings are usually quite rational and make systematic use of the information available to them’ (Ajzen & Fishbein 1980, p. 5). ‘Attitudes follow reasonably from the beliefs that people hold about the object of the attitude, just as intentions and actions follow reasonably from attitudes’ (Ajzen 2005, p. 32). The Theory of Reasoned Actions suggests ‘... that a person’s intention to perform (or not to perform) a behaviour is the immediate determinant of that action’ (Ajzen 2005, p. 117). The link between behaviour and attitude is indirect as ‘Beliefs influence attitudes and subjective norms; these two components influence intentions; and intentions influence behavior’ (Ajzen & Fishbein 1980, p. 80) and may not be practically obtainable. The Theory of Reasoned Action was ‘... born largely out of frustration with traditional attitude–behavior research, much of which found weak correlations between attitude measures and performance of volitional behaviors’ (Hale, Householder & Greene 2003, p. 259). The following Figure 35 depicts a ‘Schematic presentation of [a] conceptual framework for the prediction of specific intentions and behaviors’ (Fishbein & Ajzen 1975, p. 16).

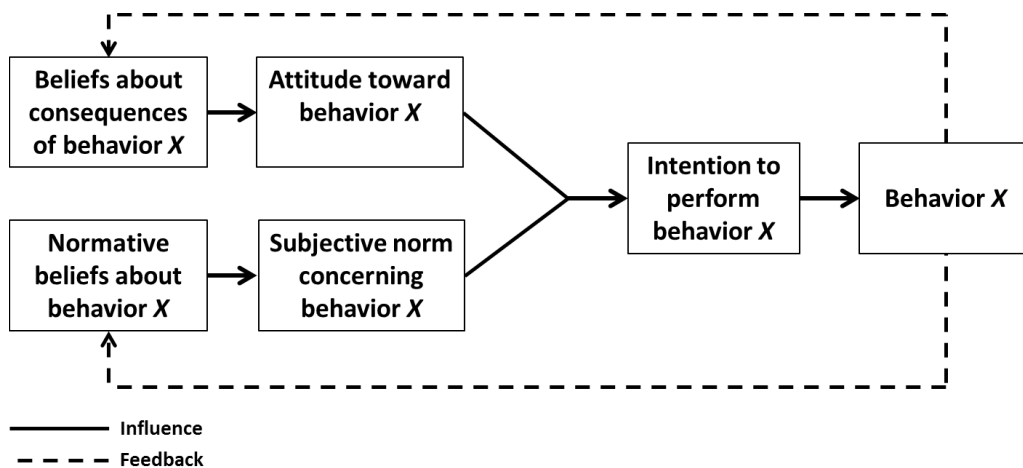


Figure 35: Theory of reasoned action (Fishbein & Ajzen 1975, p. 16)

Several limitations of the Theory of Reasoned Action have been explored, namely the difference between goals and behaviours, the alternatives people can choose between, and intentions versus estimates. The Fishbein and Ajzen model ‘... was developed to deal with behaviors and not outcomes or events that result from behaviors’ (Sheppard, Hartwick &

Warshaw 1988, p. 326). The model also does not account for how goals are determined, and what the consequences are if the goals are not achieved. In developing the Theory of Reasoned Action, the focus is on a single behaviour and has omitted to consider what may occur if there is a '... possibility of choosing among alternative behaviours' (Sheppard, Hartwick & Warshaw 1988, p. 326). What an individual intends to do to achieve a goal and '... their subjective estimates of whether they will actually perform the behavior or achieve the goal' may be quite different (Sheppard, Hartwick & Warshaw 1988, p. 327).

The following Table 25 presents an overview of where the literature and data converged with the Theory of Reasoned Action, and where this theory has been confirmed or may be extended as a result of this review. A detailed table including all literature themes and data convergence and divergence with the Theory of Reasoned Action is included in Appendix 7 for reference.

Table 25: Divergence and convergence between the theory of reasoned action, the literature and data

Data Converging with the Literature	Data Diverging from the Literature	Convergence of Literature and Data with Theory of Reasoned Action	Can the Theory be Confirmed or Extended?
<p><b>Knowledge Exchange</b></p> <p><u>Performance Improvement</u>: can lead to demonstrated success by adopting a formalised structure to benchmark results.</p> <p><i>‘I suppose having discussions and bringing together our knowledge around the <b>improvements</b> which we could do and how we could change things and formalise things’ (Sierra).</i></p>	<p>No divergence observed.</p>	<p>A model depicting belief leading to attitude, leading to intentions and ultimately the behaviour ‘... was developed to deal with behaviors and not outcomes or events that result from behaviors’ (Sheppard, Hartwick &amp; Warshaw 1988, p. 326). This model does not account for how goals are determined, and what the consequences are if the goals are not achieved, as was identified in the data.</p>	<p><b>Extend</b></p> <p>Understanding the implications of making informed decisions about determining goals or outcomes could <b>extend</b> the ToRA.</p>
<p><b>Knowledge Drivers</b></p> <p><u>Personality, Motivation and Behaviours</u>: influenced by organisational culture, instinct, leadership, and team dynamics.</p> <p><i>‘It’s just the sort of <b>behaviours</b> that are being identified that describe the <b>culture</b> we want into the future is about openness and sharing of information’ (Whiskey).</i></p>	<p>No divergence observed.</p>	<p>Research participants demonstrated through their behaviours intention was a result of both individual and normative beliefs and attitudes, where ‘... a person’s intention to perform (or not to perform) a behaviour is the immediate determinant of that action’ (Ajzen 2005, p. 117).</p>	<p><b>Extend</b></p> <p><b>Extending</b> the ToRA to encompass the <i>influence</i> of an organisation, or multi-unit entity, on a project manager’s behaviour could elicit a further application of this theory through social norms generated to reinforce behaviour.</p>

#### 5.4.4 Summary of Theoretical Considerations

I examined the three core theories of social exchange, action, and reasoned action to identify any convergence or divergence with the literature and data. These themes were also reviewed in ‘Section 5.3 Supporting Evidence’ against the data to identify where there may be a convergence or divergence, with the results brought forward to the examination of the three theories. Where there was convergence between a theme with the literature and data, the

theme was further examined to determine if there was an opportunity to confirm or extend the theory. The extension to Social Exchange Theory is in the area of tacit knowledge acquisition through communities of practice where tangible and intangible assets can be exchanged. The Theory of Action was examined through the literature and data, where it was apparent three of four of the research themes, being knowledge exchange, knowledge environment, and learning approaches, diverged. An extension to the Theory of Action would be to further the understanding of the impact of personality, motivation and behaviours on driving knowledge, which is also part of extending the Theory of Reasoned Action. I also suggest extending The Theory of Reasoned Action with regard to improving performance through knowledge exchange.

The Figure 36 below illustrates the convergence between the Theory of Social Exchange, the Theory of Action and the Theory of Reasoned Action. The use of a solid line depicts an extension to a theory, and the use of a broken line indicates the theory is confirmed by the literature and data. There are several literature and data boxes that do not link to any of the three theories. This indicates that there is no connection suggested by the literature and data.

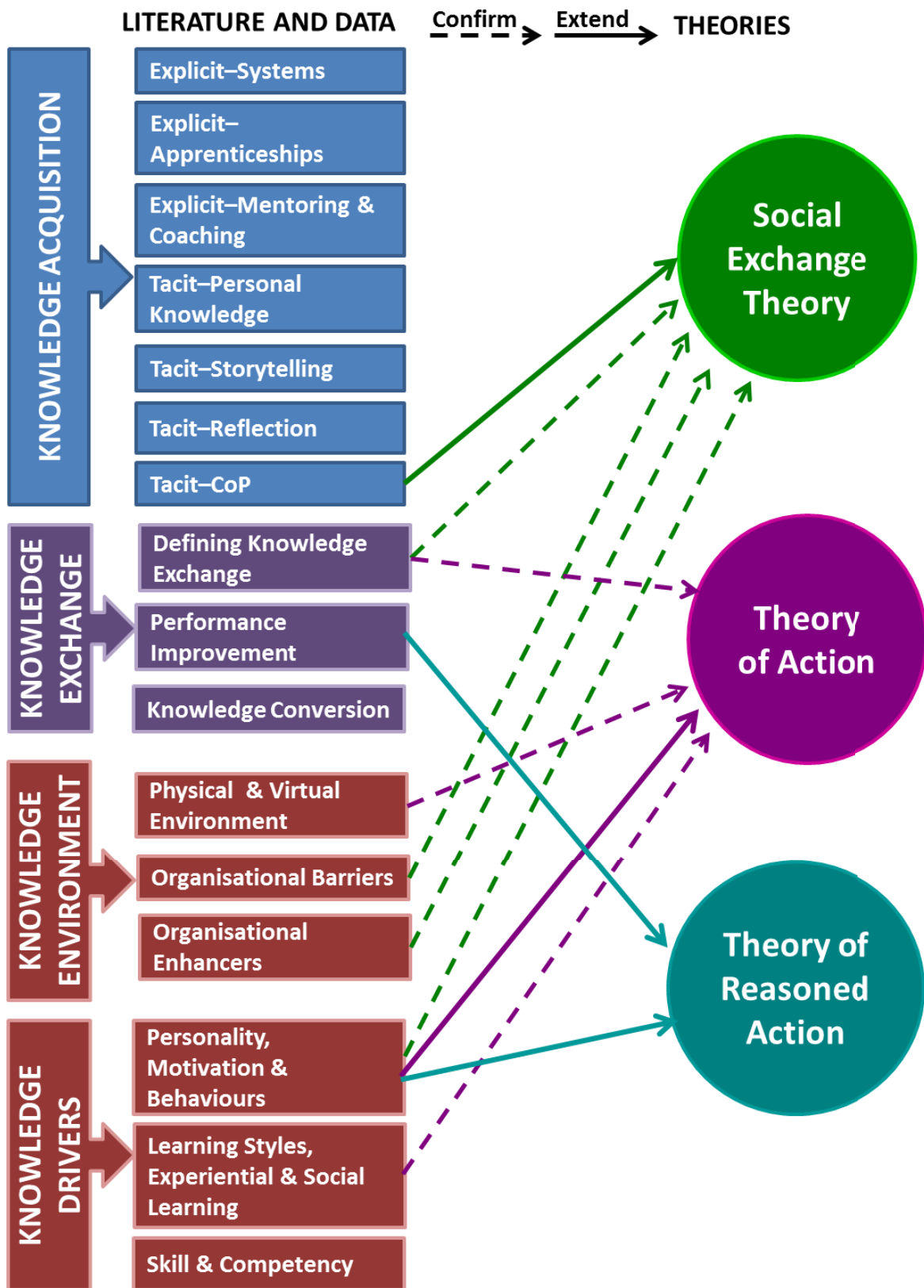


Figure 36: Map confirming or extending theory based on convergence with literature and data



The three theories each apply to the dynamic nature of knowledge acquisition and exchange in the project environment in different ways with not one clearly representative of the area of investigation. However, the theory most closely aligns overall to knowledge acquisition and exchange, and the environment and drivers impacting on this occurring, is Social Exchange Theory. The relationships developed between individuals and groups when they exchange knowledge are by their nature based on a social exchange of a valuable asset. The Theory of Action can be applied to how project managers generate solutions through thinking and acting, although this may not always generate learning. The systematic and predictable approach underpinning the Theory of Reasoned Action also may not always align to what occurs in a project context, although this may be the goal of the project manager. The contribution of this research to each of these theories is addressed in 'Chapter 6: Conclusions and implications, Section 6.4.1'.

## **5.5 Validation**

The approach I developed for this research into how project managers acquire and exchange knowledge in Australia '... accurately represents the social phenomena to which it refers' (Hammersley 1990 p. 57) and can therefore be described as valid. The interpretivist approach of the research required a rigorous approach to data collection and analysis so as to ensure the research was valid (Dick 1999b). The rigorous approach I took to collect data '... to see whether they corroborate one another' (Silverman 2011, p. 369) meets this requirement. I also used what Silverman (2011, p. 369) refers to as respondent validation by showing the research participants my notes on the responses they gave to the interview question about how they exchanged knowledge. This was to allow the research participants to review what they had suggested was useful when we discussed the elements they would require in a knowledge exchange instrument.

The validity of my participation in the research is aligned to Angen's (2000) proposed considerations to ensure research has validity in terms of ethics and content. I prepared and managed the research addressing each of Angen's questions in Table 26 below.

Table 26: Researcher validity aligned to ethical and substantive validity (Angen 2000)

<b>Ethical Validity</b> <i>Political and ethical considerations</i>	<b>Substantive Validity</b> <i>Substance or content considerations</i>	<b>Researcher Validity</b> <i>Self-reflection by researcher</i>
<ul style="list-style-type: none"> <li>Is the research helpful to the target population?</li> </ul>	<ul style="list-style-type: none"> <li>What is the evidence of the interpretive choices the researcher made?</li> </ul>	<ul style="list-style-type: none"> <li>The categories were formed between each intervention when analysing the data to ensure interpretive choices were data driven.</li> </ul>
<ul style="list-style-type: none"> <li>What are the alternative explanations to those constructed by the researcher?</li> </ul>	<ul style="list-style-type: none"> <li>What were the biases inherent in the work over the lifespan of a research project?</li> </ul>	<ul style="list-style-type: none"> <li>Biases were minimised by analysing the data sequentially, not at the same time.</li> </ul>
<ul style="list-style-type: none"> <li>What has been learned from the research?</li> </ul>	<ul style="list-style-type: none"> <li>Did we reflect to understand our own transformation in the research process?</li> </ul>	<ul style="list-style-type: none"> <li>The researcher kept reflective journals after each intervention to identify self-transformation during the research.</li> </ul>

I also demonstrated characteristics of what Angen (2000) describes as a ‘good’ researcher.

These characteristics include:

*‘... good people skills; resilience, patience, and persistence in the face of ambiguity and slow progress; and versatility, flexibility, and meticulousness in carrying out the details of the project. The skills of being a creative and persuasive writer are also required, as is the need to be passionately involved in the topic’ (Angen 2000, p. 391).*

In addition, to meet what Sankaran (1999, p. 263) describes as four approaches to validation, I offer the following observations of my investigation:

- **Self-Validation:** I continuously captured my insights throughout the research in a reflective journal, and included notes from every meeting and interaction. These reflections were also included in the analysis of the data.
- **Peer Validation:** I formed an external reference group, described in ‘Chapter 3: Research Methodology and Method, Section 3.8.1’, which assisted in reviewing various approaches for the research. I published peer reviewed journal articles and conference papers during the investigation, which are listed in the front section of this thesis. These papers generated insights into the phenomena I was investigating, and how I

had constructed the research method. One of my papers outlining the research method won an international research award.

- Academic Validation: I was supervised by two accomplished academics, guided by four close academic colleagues in different universities, and attended three doctoral colloquiums during my research. All these contact points yielded feedback and confirmation on the approach I was using to examine the research questions.
- Validation by the Public: the publication of my thesis is deemed to be public validation.

## **5.6 Rigour**

To understand the different perspectives of how knowledge is acquired and exchanged I deliberately structured multiple ways to collect data. In action research this approach is called triangulation and is used ‘... when checking the description of an action, or process, or outcome’ (Piggot-Irvine 2008, p. 21). I explored the research questions through the combination of interviews with, and observations of, the research participants; interviews with colleagues of the research participants; reflective journals completed by the research participants and myself; a focus group meeting, and meetings with the external reference group. The data was collected at different times and in different contexts over 18 months to generate ‘... at least three angles on the issue under review’ (Piggot-Irvine 2008, p. 21). These different angles offered a perspective for me to prepare for subsequent interventions in the action research cycles. The time between the interventions minimised the opportunity for the research participants and myself to remember specifically what was said or observed in each intervention. I examined the claims through cross checking the data, literature and theories for any divergence from and convergence to arrive at my assumptions (Piggot-Irvine 2008, p. 150). ‘Action research acknowledges subjectivity, and rather than seeing objectivity, instead demonstrates freedom from bias. Thus, confidence in trustworthiness of data can be achieved through triangulation, reflexivity and member checks’ (Meyer 2000, p. 9) providing the rigour to validate this methodology.

I ensured ‘... the need to maintain rigour and credibility in the knowledge or theory generated through real life interventions’ (McKay & Marshall 2001, p. 57) was at the forefront of all research activity. The establishment of the external reference group as a ‘... community of critical friends whose commitment is to testing the arguments and evidence advanced in the account of the study’ (McTaggart 1997, p. 187), offered a rigorous approach to undertake the research. The reflective approach of my research demonstrates what Lalonde Bourgault and Findeli (2010) refer to as a level of rigour based on practical relevance (2010, p. 24). Also, the

use of multiple sources of information and overlapping data from each research participant ensured the necessary rigour to validate the research (Dick 1999b).

## **5.7 Evaluation**

The evaluation of the research was based on a formative model as a way ‘... of improving and enhancing programs not only in their initial development, but at any point in the life of a program’ (Patton 1986, p. 66). This form of evaluation ‘... is especially appropriate for developing, innovating, or changing programs in which the focus is on program improvement, facilitating more effective implementation, and exploring a variety of effects on participants’ (Patton 1986, p. 203). I used several evaluation tools to improve and enhance the investigation during the development of the research, and the collection, and analysis of data. These tools included action research models, defined data collection modes, and data analysis frameworks. The formation of the external reference group created a forum to evaluate the research approach regularly as it was being developed, implemented, and then reviewed. When I was collecting the data I evaluated the reliability of the sources through asking questions and observing the research participant and their work colleague to generate several dimensions and perspectives for the study. Analysing the data required me to adopt a multilayered approach to ensure the findings were based on evaluating the data in a consistent way at the end of each of the interventions. This approach required me to be ‘... active-reactive-adaptive in analyzing situational variations’ (Patton 1986, p. 308) to make and record any adjustments made when analysing the data in subsequent interventions.

## **5.8 Summary**

The discussions in this chapter focus on providing supporting evidence for, justification of, and providing counter points for the claims in the study. The claim is made that knowledge is acquired through a combination of experience, formal training, and informal mentoring. The exchange of project management knowledge is predominantly accomplished in an impersonal and formal manner, and occurs in a social, systematic way to generate beneficial outcomes. The claims recognise the potential impact of organisational culture and politics, and the influence this has on people’s personality which drives instinctive behaviours, on knowledge acquisition and exchange. The claims identify qualifications and experience have a direct impact on acquiring and exchanging knowledge, and inconsistent approaches to the creation of learning opportunities limit the acquisition and exchange of knowledge.

I presented supporting evidence of the research claims through examining the research framework, including the project management context, knowledge acquisition, knowledge exchange, and knowledge environment and drivers. The examination compared the literature with the data, identifying where there was convergence and divergence. In most areas the data supported the literature, except where it was not addressed in the areas, of explicitly acquiring knowledge through formal systems, such as apprenticeships, and the extraction of tacit personal knowledge, and in the reactive manner the research participants established their physical and virtual project environments.

A theoretical framework was prepared to examine Social Exchange Theory, the Theory of Action, and the Theory of Reasoned Action to identify any divergence and convergence to the literature and data. This examination produced five theoretical areas for further extension, including tacit knowledge acquisition through communities of practice in Social Exchange Theory; improving performance through knowledge exchange in the Theory of Reasoned Action; and the impact of personality, motivation and behaviours on driving knowledge across the Theory of Action and the Theory of Reasoned Action. The theory that most closely aligns overall to how knowledge is acquired and exchanged, and the environment and drivers underpinning knowledge acquisition and exchange, is Social Exchange Theory. However, elements of the Theory of Action and Reasoned Action are represented in this study.

I validated the study through ethical and substantive approaches, as well as researcher or self-validation, peer validation, academic validation, and validation by the public. I presented the multiple perspectives of an action research methodology where data is collected using specific approaches. The rigour required for the study was demonstrated through the involvement of an external reference group and the use of reflective practices. A formative model was used to evaluate the research to improve and enhance the investigation through several dimensions and perspectives.

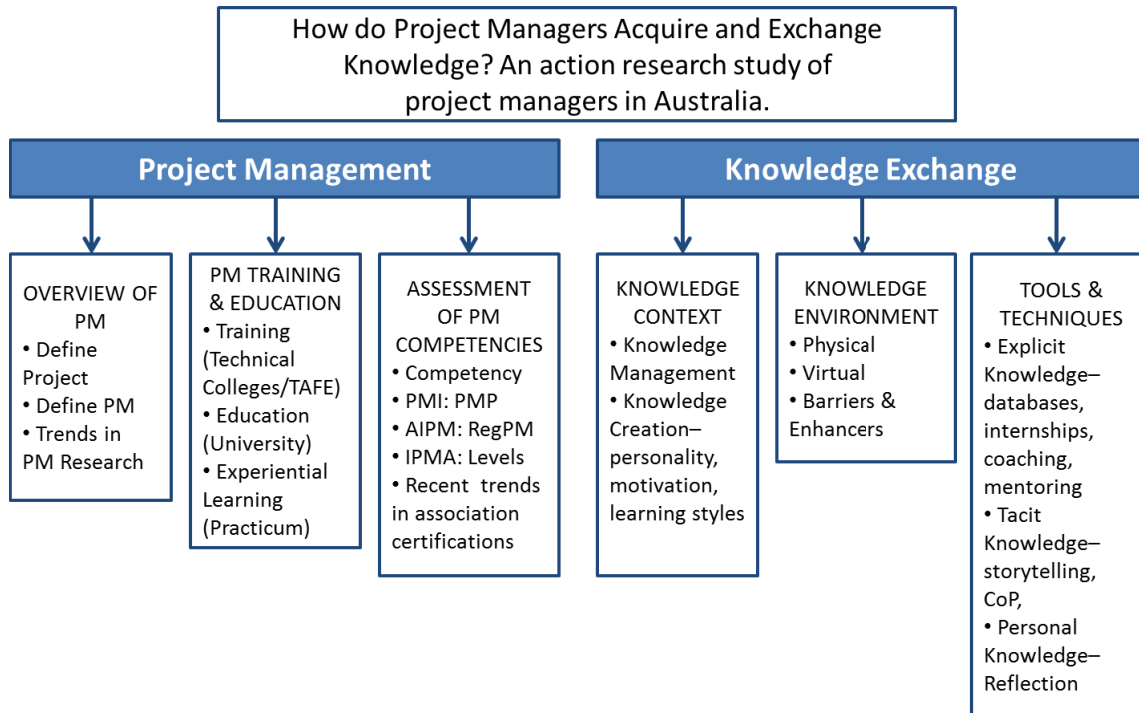
Several counter claims were offered to demonstrate my awareness of the possible alternate views in the study. In response to these counter claims I suggest project managers need to participate in the formation of strategy and be involved across the whole organisation; balance the desire to espouse the virtues of embedding knowledge-based practices with demonstrated success across multiple domains; embed these practices so they are relevant beyond the temporary project environment and any *ad hoc* recognition programs; and clearly define the language used to describe multidirectional flows of knowledge to avoid limiting access and understanding.

## 5.9 Appendices

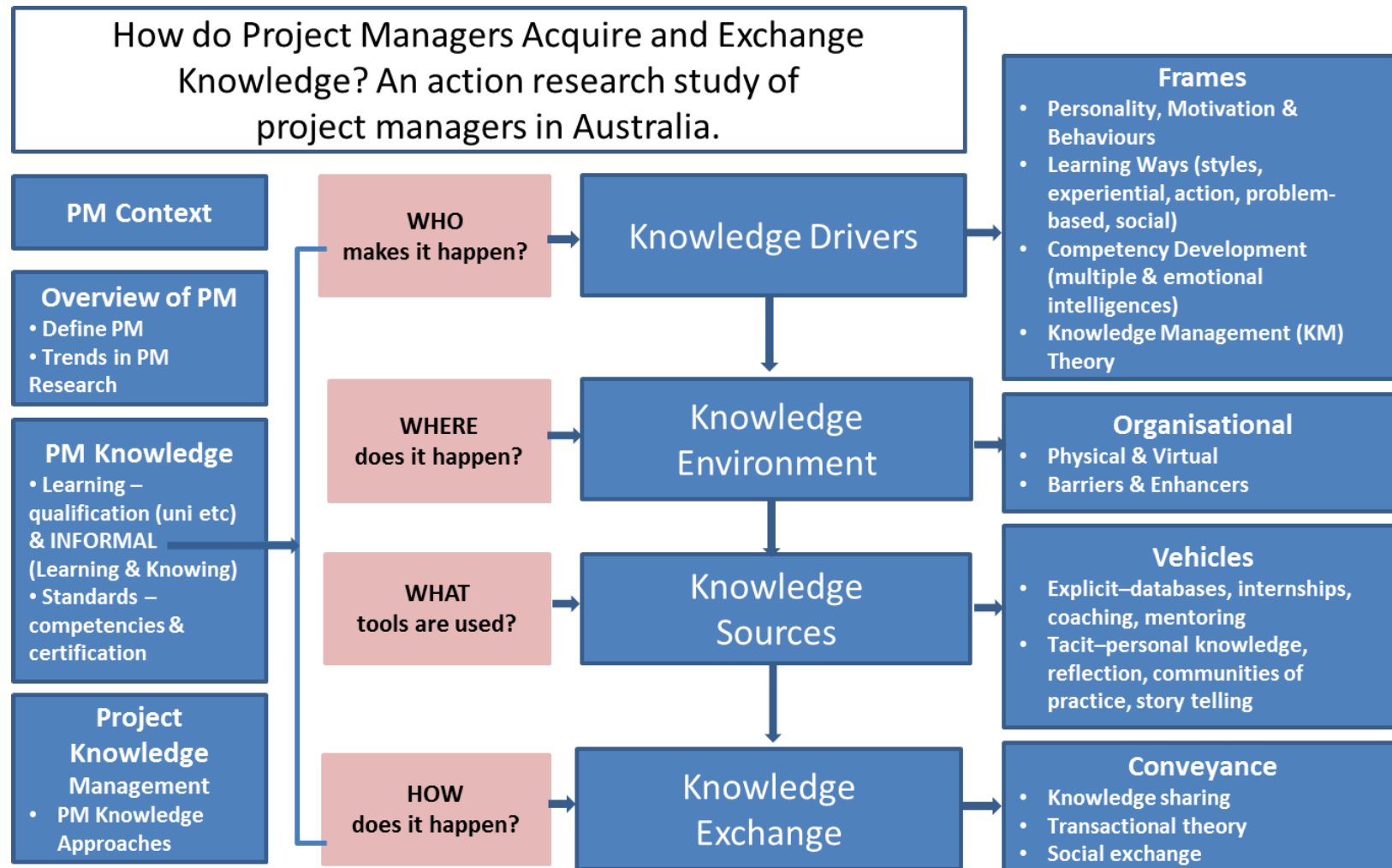
### Appendix 1–Sequential Development and Refinement of Research

#### Framework

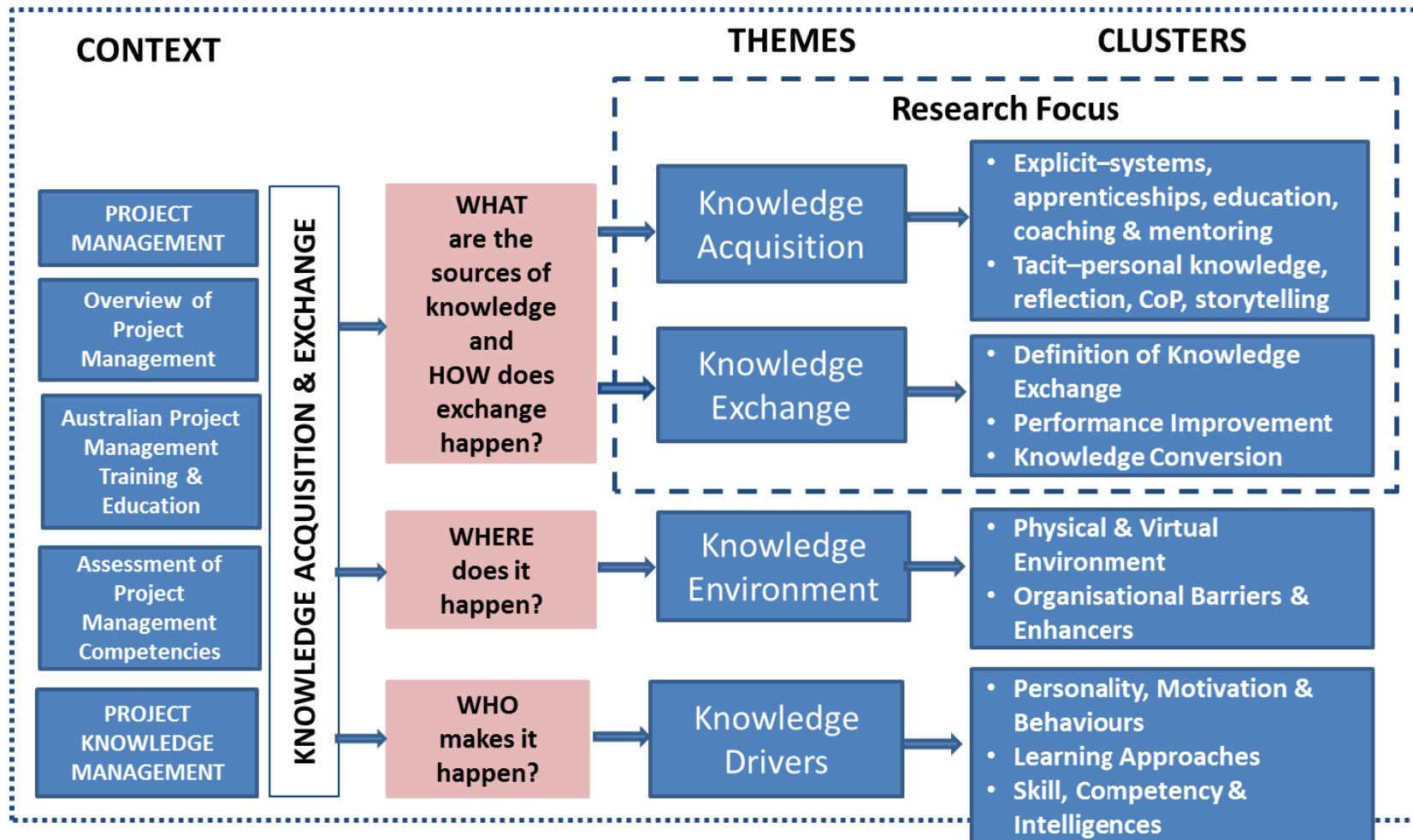
1.1 First research framework included broad headings and grouped areas for review in the literature



1.2 Second research framework evolved from the first research framework to ask Who, Where, What and How knowledge was acquired and exchanged

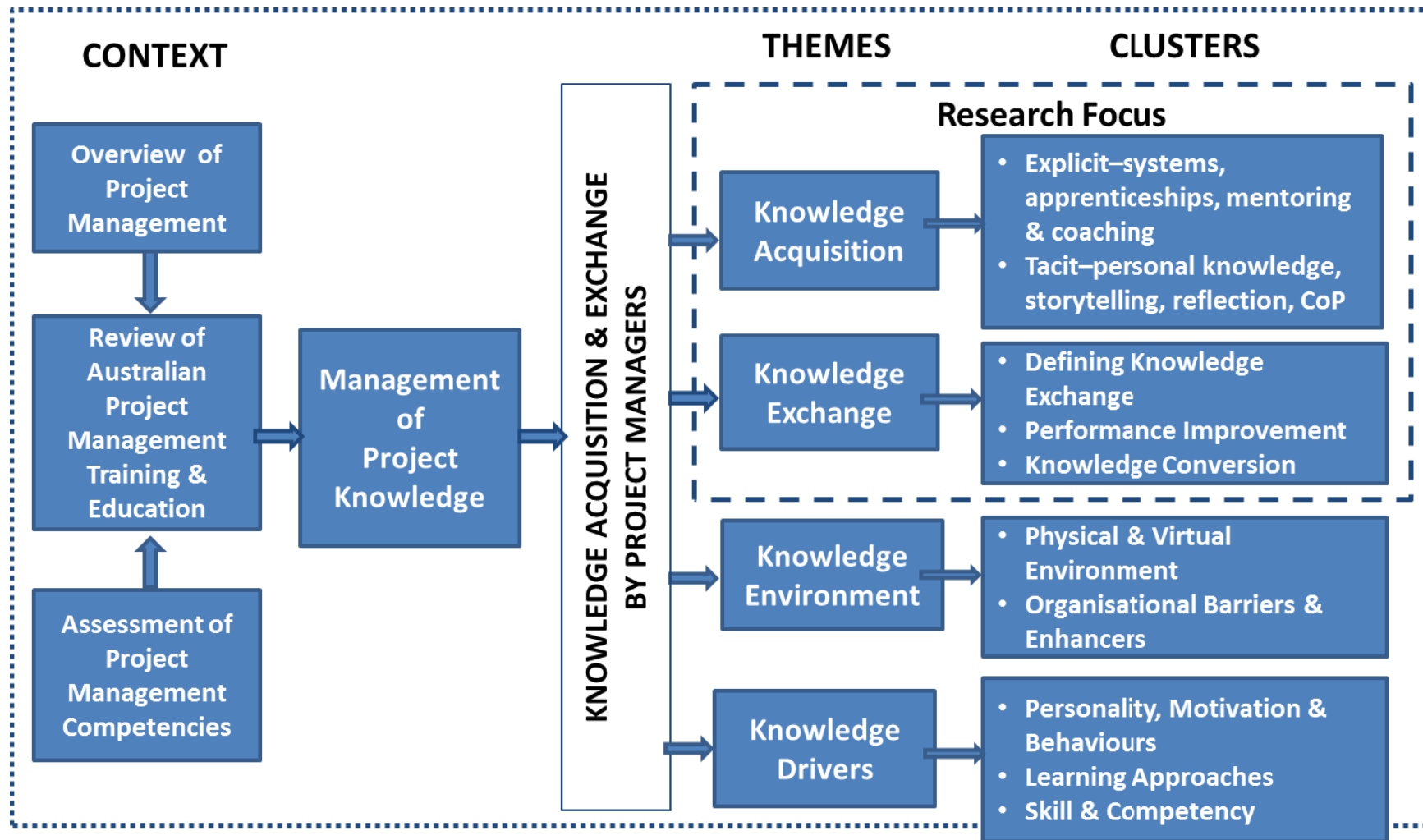


1.3 Third research framework presents more discrete themes for investigation, separating the project management investigation to the identification of knowledge acquisition, exchange, the context and drivers





1.4 Fourth research framework presents a clear distinction between the literature themes



## Appendix 2–Divergence and Convergence between the *Knowledge Acquisition* Literature and Data

Literature Themes	Findings from the <i>Data</i>	<i>Data Converging</i> with the Literature	<i>Data Diverging</i> from the Literature
<p><b>Knowledge Acquisition:</b> <i>Explicit</i></p> <p><u>Systems Approach</u></p> <p>Use of intranets, data warehouses, networks.</p>	<p>Research participants intended to utilize established systems and developed their own systems to locate and store knowledge to use on future projects.</p> <p><i>‘It was filed in <b>systems</b> accessible and if you took the time to do it, the archive of lessons learned was there’ (Mike).</i></p>	<p>The literature and the data confirm it is beneficial to the acquisition of knowledge to have a system for the orderly repository for explicit knowledge generated from project work. Networks can then be built ‘... so that people can find each other, [and information]... to facilitate collaboration’ (Pfeffer &amp; Sutton 1999, p. 89).</p> <p>In practice the research participants rarely accessed a formal system to acquire knowledge due to time constraints and lack of confidence in the knowledge contained in the system.</p>	<p>No divergence of data evident.</p>
<p><b>Knowledge Acquisition:</b> <i>Explicit</i></p> <p><u>Apprenticeships</u></p> <p>Develop new skills on-the-job guided by a master in a predictable environment.</p>	<p>The lack of data from the action research cycles indicated the practice of explicitly acquiring knowledge through formal master-apprentice relationships did not occur with the research participants in the research sample. However, there was evidence from the observations there was informal guidance from others to guide previous project work.</p>	<p>At times the research participants were observed trying to balance the needs of the individual with the needs of the organisation. This may have been assisted by a more structured approach using an apprenticeship framework (Bourne &amp; Walker 2004, p. 239).</p>	<p>No divergence of data evident.</p>

Literature Themes	Findings from the <i>Data</i>	<i>Data Converging</i> with the Literature	<i>Data Diverging</i> from the Literature
<p><b>Knowledge Acquisition: <i>Explicit</i></b></p> <p><u>Coaching and Mentoring</u></p> <p>Formal or informal engagement beyond direct line management to enable explicit learning and development to occur to improve performance.</p>	<p>The influence of an informal or formal coach or mentor played a significant role in the development of a project manager's knowledge. The position the coach or mentor held within the organisation was irrelevant if they gave explicit support and knowledge required in a timely manner.</p> <p><i>'One of the things we do quite regularly in my division is <b>coaching</b> project managers and I thoroughly enjoy doing it' (Mike).</i></p> <p><i>'I had an excellent <b>mentor</b> at that time in terms of going off and doing the job' (Whiskey).</i></p>	<p>The literature and the data converge on the value of coaching and mentoring to explicitly acquire knowledge. Mentoring or coaching is '... designed to ... guide the desired behavior change of those involved' (Murray 1991, p. 5). The benefit of the knowledge acquired, whether through formal or informal programs, has a direct and positive impact on developmental opportunities for research participants.</p>	<p>No divergence of data evident.</p>
<p><b>Knowledge Acquisition: <i>Tacit</i></b></p> <p><u>Personal Knowledge</u></p> <p>Knowledge held by an individual that is organized and used to accomplish goals and create new knowledge at any time and often 'nonconsciously'.</p>	<p>The ability for a project manager to recognise how they acquired and used tacit knowledge to manage projects was difficult for them to explain. They understood and recognised the value of personal knowledge, even when not fully aware of how it was acquired.</p> <p><i>'Instinctively [...] I probably didn't need this to know what to do in a meeting' (Bravo)</i></p> <p><i>'A lot of it is common sense and sometimes we do it <b>intuitively</b> but we sometimes need reminders' (Lima).</i></p>	<p>The literature presents a clear description of personal knowledge not directly evident in the data as it '... is the least accessible but most complete form of knowledge' (Dalkir 2005, p. 64). This was due to the nature of tacit knowledge being known often only to the research participant.</p>	<p>No divergence of data evident.</p>

Literature Themes	Findings from the <i>Data</i>	<i>Data Converging</i> with the Literature	<i>Data Diverging</i> from the Literature
<p><b>Knowledge Acquisition:</b> <b><i>Tacit</i></b></p> <p><u>Storytelling</u></p> <p>Social exchange or narrative to clarify meanings by sharing knowledge between people with the possible intention of eliciting an outcome.</p>	<p>Research participants created opportunities to embed lessons and generate new knowledge through sharing experiences in the form of stories. The stories had a purpose and were relevant to a specific situation or context.</p> <p><i>'You go out on site and invariably somebody will tell a <b>story</b> about [...] what we did and there's all those sharing of those <b>stories</b> ... but they're not just telling stories for that sake. It's really related to something that's going on and usually there's a lesson out of it that you can apply' (Delta).</i></p> <p><i>'They want us to start with a <b>story</b>. It's not a project report. It's a story' (Delta).</i></p>	<p>The verbal or written narrative to deliver a message in the form of stories is aligned between the literature and the data. The purposeful role of the storyteller to offer '... a detailed explanation of the cause-and-effect relationship between an action and its consequence (Denning 2006, p. 45) can '... generate and disseminate knowledge' (Laufer &amp; Hoffman 2000, p. xvi).</p>	<p>No divergence of data evident.</p>
<p><b>Knowledge Acquisition:</b> <b><i>Tacit</i></b></p> <p><u>Reflection</u></p> <p>Social collaboration to embed knowledge through individual reflection illuminating pathways not previously considered. This external trigger can be used</p>	<p>There was an understanding reflection improved the management of projects. However, there existed a random approach to bringing individual reflections from previous experiences to current project/s. There were formal structures built into project plans to review progress on the current project, with the expectation individuals would apply relevant lessons learnt from past experiences.</p> <p><i>'It <b>helped me to see</b> the difficulties and the</i></p>	<p>The benefit of reflection is confirmed between the literature and the data where it enables the research participants to '... extract cues and make plausible sense retrospectively, while enacting more or less order into those ongoing circumstances' (Weick &amp; Sutcliffe 2005, p. 409). Reflection offers a valuable tool if used explicitly, respecting the informal way individuals reflect. The value of reflection extends</p>	<p>No divergence of data evident.</p>

Literature Themes	Findings from the <i>Data</i>	<i>Data Converging</i> with the Literature	<i>Data Diverging</i> from the Literature
<p>as a filter to identify priorities to make sense of information based on past experiences.</p>	<p><i>issues and the problems and then learn from those' (Delta).</i></p> <p><i>'If you start <b>thinking</b> about this from different angles the answer will come to you' (Mike).</i></p> <p><i>'I found it really, really useful to have a group of friends who are either managers or project managers or in some sort of leadership role that you can actually <b>bounce ideas off</b>' (Lima).</i></p>	<p>to socialising relevant experiences beyond the confines of the current project.</p>	
<p><b>Knowledge Acquisition: Tacit</b></p> <p><u>Communities of Practice</u></p> <p>A structured group with shared expertise, identity, and purpose where individuals, through social interactions, gain skills. The group abides by the following guidelines:</p> <ul style="list-style-type: none"> <li>• Clear operational rules</li> <li>• Common language</li> <li>• Social events</li> <li>• Co-location of staff</li> <li>• Creation of shared history</li> </ul>	<p>The research participants used both informal and formal groups aligned to their project or their role in an organisation. There was less interest in joining external communities, such as discipline-specific groups, unless a direct benefit was seen to their current work and future career.</p> <p><i>'There's a [internal] young professionals <b>network</b> set up. We try and get people together to share their experiences' (Whiskey).</i></p> <p><i>'The [external] <b>networking</b> I thought was quite onerous - young family and that sort of thing. So I thought not right now' (Delta).</i></p> <p><i>'It is very important to be able to <b>network</b> across people' (Bravo).</i></p>	<p>The literature offers clear guidelines and benefits to create and sustain communities of practice which are reflected in the data. Outcomes of a community of practice are '... shared identity, foster commitment/ obligation and codependence and support social interaction' (Hall 2001, p. 15). In the workplace however, with pressures to meet project deadlines and client needs, the research participants have limited opportunity to engage in external groups, unless a clear and direct benefit is identified. Often a community of practice is established around a current project and dissolves when focus changes, unless formally established within, or external to, the organisation.</p>	<p>No divergence of data evident.</p>

### Appendix 3–Divergence and Convergence between the *Knowledge Exchange* Literature and Data

Literature Themes	Findings from the <i>Data</i>	<i>Data Converging</i> with the Literature	<i>Data Diverging</i> from the Literature
<p><b>Knowledge Exchange</b></p> <p><u>Knowledge Exchange</u></p> <p>The deliberate interaction between decision makers and other individuals or groups of people who are working together to achieve an outcome. It is considered to be a social process where various contingent histories, professional perspectives, and local conditions interact in a systematic, mutual way to share tacit knowledge in order for it to become explicit knowledge.</p>	<p>Research participants understood the value of exchanging knowledge to ascertain what was, and what has been occurring on a project in order to progress their work. The ability to engage in formal and informal exchanges allowed them to connect with stakeholders and share tacit and explicit knowledge. Some of the most valuable exchanges generated insights into negative outcomes so lessons could be captured for future projects.</p> <p><i>‘It was termed a lessons learned review but one of the critical things about it was about <b>knowledge exchange</b>’ (Whiskey).</i></p> <p><i>‘I’ve <b>shared</b> the information and hung out the dirty linen. Which you should do on bad projects’ (Bravo).</i></p> <p><i>‘Information <b>shared</b> is better than information retained’ (Whiskey).</i></p> <p><i>‘I’ve got to take those opportunities to <b>share</b> that knowledge and find out what other people are doing and hear about their day so to speak’ (Delta).</i></p> <p><i>‘We were able to <b>transfer</b> a bit of an insight as to how</i></p>	<p>The data converges with the literature in the requirement for key people engaged with the project to deliberately exchange knowledge as it is a ‘... powerful way to share, replicate, and scale up what works in development’ (Kumar &amp; Leonard 2011, p. 1). The data also supports the literature where social interaction occurs for knowledge to be exchanged in a mutually beneficial and systematic manner in order to achieve a desirable outcome.</p>	<p>It is when these exchanges are unplanned data differs from the literature as ‘...there are very few descriptions of how knowledge exchange unfolds in practice’ (Ward et al. 2012, p. 2). These <i>ad hoc</i> interactions occurring in practice may produce beneficial outcomes.</p>

Literature Themes	Findings from the <i>Data</i>	Data <i>Converging</i> with the Literature	Data <i>Diverging</i> from the Literature
	<p><i>best to work with certain people’ (Sierra).</i></p> <p><i>‘We have a great focus on knowledge <b>transfer</b> or sharing at this point in time given the number of people in senior positions who will retire within the next two years’ (Whiskey).</i></p>		
<p><b>Knowledge Exchange</b></p> <p><u><i>Performance Improvement</i></u></p> <p>The exchange of knowledge can lead to demonstrated success (O'Dell &amp; Jackson Grayson 1998) and enhanced performance (Hall 2001) through full and open knowledge exchange, particularly prior to staff turnover.</p>	<p>The desire to improve performance through the active exchange of knowledge was recognized in the project management community. There was frustration amongst those empowered to deliver projects at seeing this not occur due to people interfering or loss of knowledge hindering the outcomes being delivered.</p> <p><i>‘I suppose having discussions and bringing together our knowledge around the <b>improvements</b> which we could do and how we could change things and formalise things’ (Sierra).</i></p> <p><i>‘Them not being able to - not wanting to listen to anybody else about how <b>improvements</b> could be made. It was quite frustrating’ (Sierra).</i></p> <p><i>‘If we were actually conscious of how information and knowledge moved around the organisation, [it] would help the <b>performance</b> of the organisation’ (Whiskey).</i></p>	<p>The data and literature confirm there is a compelling body of evidence to demonstrate exchanging knowledge leads to demonstrated success. O’Dell and Jackson Grayson (1998, pp. 158-9) suggest knowledge exchange leads to:</p> <ul style="list-style-type: none"> <li>• A compelling call to action;</li> <li>• Demonstrated success;</li> <li>• Decentralization and downsizing;</li> <li>• Benchmarking evidence, and</li> <li>• Recognition of the potential gain.</li> </ul> <p>To improve the responsiveness of those in a position to exchange</p>	<p>No divergence of data evident.</p>

Literature Themes	Findings from the <i>Data</i>	<i>Data Converging</i> with the Literature	<i>Data Diverging</i> from the Literature
		knowledge, a structured approach can be adopted to create a benchmark for measurement.	
<p><b>Knowledge Exchange</b></p> <p><u>Knowledge Conversion</u></p> <p>To achieve appropriate outcomes, knowledge needs to be converted in an often evolving and dynamic environment. To convert tacit knowledge to explicit knowledge a four step process occurs (Nonaka, Toyama &amp; Konno 2000):</p> <ol style="list-style-type: none"> <li>1. Socialisation;</li> <li>2. Externalisation;</li> <li>3. Combination, and</li> <li>4. Internalisation.</li> </ol>	<p>No data directly linked to knowledge conversion. This is a reflection of the focus of the research on how knowledge was acquired and exchanged, not what occurred to the knowledge during or after the exchange.</p>	<p>No convergence evident in the literature reviewed.</p>	<p>No divergence of data evident.</p>



## Appendix 4–Divergence and Convergence between the Knowledge Environment and Drivers Literature and Data

Literature Themes	Findings from the Data	Data Converging with the Literature	Data Diverging from the Literature
<p><b>Knowledge Environment</b></p> <p>A project manager needs ‘... to determine if the team will meet and operate on a face-to-face basis or in a virtual environment; whether they will be located in one or multiple time zones; whether they will use multiple languages for communication’ (Project Management Institute 2013, p. 293), and consider the impact of organisational culture and structure, and the political environment.</p> <p><u>Physical Environment</u></p> <p>Project work occurs in temporary physical environments where an individual is influenced by and influences this space, or <i>ba</i>, (Nonaka, Toyama &amp; Konno 2000, p. 19) where the project manager needs to be aware of specific nuances.</p> <p><u>Virtual Environment</u></p> <p>Virtual collaborative environments can facilitate a systematic approach to project work through the use of information technology may emulate the physical environment.</p>	<p>I captured a range of approaches used in the project environments to meet the specific goals of the project through interviews and observations. The research participants used the reflective journals to capture their reflections on the impact of the environment on their project work.</p> <p><i>‘I also try and talk to people outside of the project, just to get a feel for either getting background information or a feel for the <b>political environment</b>’ (Lima).</i></p> <p><i>‘They’re thinking in terms of the <b>environment</b>, the behaviours, the <b>culture</b>’ (Mike).</i></p> <p><i>‘It was a <b>conversation over lunch</b> where you really got the whole story, the big picture and what really went on’ (Delta).</i></p> <p><i>‘The biggest contributor to our professional service performance is the <b>culture of the organisation</b>’ (Whiskey).</i></p>	<p>Clearly established protocols and managing expectations applies to both the physical and virtual environments where the individual ‘... influences and is influenced by the environment ... with which he or she interacts’ (Nonaka, Toyama &amp; Konno 2000, p. 8). The data supported the literature in the creation of a space to exchange knowledge, however there was no specific literature found to support the <i>ad hoc</i> interactions I observed.</p>	<p>The data diverged from the literature as the research participants established their physical and virtual project environments in a reactive manner due to technical and/or political external pressures. As a result the research participants were unable to ‘... supply support and scaffolding for learning and reflection within the authentic, real world contexts in which knowledge construction naturally occurs’ (Lee &amp; McLoughlin 2007, p. 23).</p>

Literature Themes	Findings from the <i>Data</i>	Data <i>Converging</i> with the Literature	Data <i>Diverging</i> from the Literature
<p><b>Knowledge Environment</b></p> <p><u>Organisational Barriers</u></p> <p><b>Barriers</b> to knowledge acquisition and exchange in the project environment include:</p> <ol style="list-style-type: none"> <li>1. Lack of executive support</li> <li>2. Not having the active support of identified ‘knowledge’ champions</li> <li>3. Misunderstanding of the value of knowledge management (Hase, Sankaran &amp; Davies 2006, pp. 37-8).</li> </ol> <p>In addition, O'Dell and Jackson Grayson (1998, p. 155) found ignorance, absorptive capacity of the recipient, and a lack of a relationship between the source and the recipient of knowledge were the top three barriers to knowledge exchange, and one the ‘ ... biggest impediments ... was culture’ (Ruggles 1998, p. 86).</p> <p><u>Organisational Enhancers</u></p> <p><b>Enablers</b> enhancing knowledge acquisition and exchange in the project environment include ‘... technology, culture, leadership, and measurement’ (O'Dell &amp; Jackson Grayson 1998, p. 163). To facilitate</p>	<p>The research participants were not specifically asked what enabled or hindered the acquisition and exchange of knowledge. However, they suggested what the barriers were, and I observed how they managed to mitigate these and put in place processes to enhance knowledge acquisition and exchange.</p> <p><i>‘It breaks down the <b>barriers</b> between those business units where we’re trying to do the one thing across the whole business’ (Whiskey).</i></p> <p><i>‘It’s just a bit of a <b>roadblock</b> as well. It stops you kind of progressing. It just stalls you unnecessarily’ (Sierra).</i></p> <p><i>‘Out of this influence at an organisational level how we might <b>not create barriers</b> to knowledge exchange. I’m not going as far as thinking about what might positively encourage it, but what we might be able to do to eliminate barriers’ (Whiskey).</i></p>	<p>There was a strong convergence between what the literature espouses to be the barriers to knowledge acquisition and exchange, and how best to mitigate and manage these in practice. The data clearly indicated the barriers faced by the research participants in their organisations included lack of support and leadership, and lack of or incorrect knowledge leading to misunderstandings. Also, one of the ‘ ... biggest impediments ... was culture’ (Ruggles 1998, p. 86).</p>	<p>No divergence of data evident.</p>

Literature Themes	Findings from the <i>Data</i>	Data <i>Converging</i> with the Literature	Data <i>Diverging</i> from the Literature
<p>this to occur:</p> <ul style="list-style-type: none"> <li>• Identify a common purpose and common fate to break down silos</li> <li>• Value knowledge sharing over personal technical expertise and knowledge creation</li> <li>• Create opportunities for contact, relationships, and common perspectives among people who don't work side by side. <ul style="list-style-type: none"> <li>• Recognise and capture tacit knowledge</li> <li>• Build knowledge sharing into work practices by allowing time and offering rewards.</li> </ul> </li> </ul>			
<p><b>Knowledge Drivers</b></p> <p>The drivers underpinning the acquisition and exchange of knowledge are divided into three clusters: 1. Personality; motivation and behaviour; 2. Learning; and 3. Skill and competency.</p> <p><u>Personality</u></p> <p>The principles of moral behaviour and personality and Maslow's (1987) 'Implications of Gratification' can create a basis on how a person will behave in certain circumstances according to '... intellect, character, temperament, disposition and temper' (McDougall 1932, p. 10).</p>	<p>The research participants were able to articulate what drove them to acquire and exchange knowledge, with the data indicating this through the work colleagues and the research participants.</p> <p><i>'I probably do it instinctively' (Lima).</i></p> <p><i>'Being able to adjust your behaviour and your communications and having the balls to make decisions and take a risk' (Bravo).</i></p> <p><i>'They were very much focused on behaviours and signs of behaviour and influencing behaviour' (Mike).</i></p>	<p>The behaviour of each research participant demonstrated a strong convergence with the literature on how knowledge exchange is influenced by '... a knowledge-intensive culture' (Cohen 1998, p. 27). The ability for personality to instinctively drive knowledge acquisition and exchange supports the literature in terms of the project manager making instinctive decisions (Lehrer 2009).</p>	<p>Managing organisational culture was addressed in the literature from the perspective of the team member, not as the data suggested in terms of the project manager who assumed leadership. 'Leaders in an organisation, specially the new comers, should know the organisational culture, boundaries and understand what are the rewards or consequences' (Dess,</p>

Literature Themes	Findings from the <i>Data</i>	Data <i>Converging</i> with the Literature	Data <i>Diverging</i> from the Literature
<p>A personality inventory may describe how people can make choices based on their awareness and perception ‘... of things, people, occurrences, and ideas’ (Myers Briggs &amp; Myers 1995, p. 1).</p> <p><u>Motivation</u></p> <p>Motivation is used to define people by their drive to reach their full potential and ‘... typically an act [that] has more than one motivation’ (Maslow 1943, p. 1). A motivation-hygiene theory (Herzberg 1987) proposes distinct factors contributing to job satisfaction, or motivation include rewards and recognition which may be explicit in the form of economic rewards, access to information and knowledge, or soft benefits such as enhanced reputation and personal satisfaction.</p> <p><u>Behaviours</u></p> <p>Behaviour can be controlled if ‘... organisational culture, boundaries and ... the rewards or consequences’ are understood’ (Dess, Lumpkin &amp; Eisner 2010). The factors motivating individual and group behaviours can influence ‘... a knowledge-intensive culture by encouraging and aggregating behaviors (sic) such as knowledge sharing (as opposed to hoarding) and pro-actively seeking and offering</p>	<p><i>‘They’re thinking in terms of the environment, the behaviours, the culture’ (Mike).</i></p> <p><i>‘It’s just the sort of behaviours that are being identified that describe the culture we want into the future is about openness and sharing of information’ (Whiskey).</i></p> <p><i>‘The biggest influence on the behaviours of individuals is the team leader’ (Whiskey).</i></p>		<p>Lumpkin &amp; Eisner 2010, p. 317).</p>

Literature Themes	Findings from the <i>Data</i>	Data <i>Converging</i> with the Literature	Data <i>Diverging</i> from the Literature
knowledge' (Cohen 1998, p. 27).			
<p><b>Knowledge Drivers</b></p> <p>I have included in this review the following approaches to learning to drive knowledge acquisition and exchange.</p> <p><u>Learning Styles</u></p> <p>The Honey and Mumford (1986) 'Learning Styles Questionnaire' identifies the Activist; Reflector; Theorist, or Pragmatist learning styles to determine preferences for exploitation. Davey et al. (2002) identified four 'Learning Style Themes' to suggest people learn by:</p> <ol style="list-style-type: none"> <li>1. Doing;</li> <li>2. Rehearsing;</li> <li>3. Addressing individualism, and 4.laddering activities to manage expectations. This type of learning can also be described as Action Learning (Yorks, O'Neil &amp; Marsick 1999).</li> </ol> <p><u>Experiential Learning</u></p> <p>The broad concept of learning through experience is where people learn in an ongoing cyclical way to form new ideas. Kolb's experiential learning cycle (1984)</p>	<p>The data did not present structured learning approaches adopted by the research participants, but instead <i>ad hoc</i> learning opportunities arose when managing projects.</p> <p><i>'Continuing to <b>ask questions</b> and poke at this from different angles until you come up with your self-discovery' (Mike).</i></p> <p><i>'The right hand to the project manager and <b>learning</b> as I went' (Delta).</i></p> <p><i>'If we fail forward, you turn the failure into a <b>learning moment'</b> (Mike).</i></p> <p><i>'Then <b>learned</b> over time as I did more of the managerial pieces to refine my organisational skills around it' (Mike).</i></p>	<p>The learning approaches identified in the literature were represented in the data when the research participants explained how they acquired some of their knowledge. This was in the form of a continuous process involving transactions between the person and the environment (Kolb 1984, pp. 26-37) to create knowledge.</p>	<p>The apparent <i>ad hoc</i> approach adopted by the research participants to acquire and exchange knowledge was not evident in the literature. However, the research participants could be '... modelling: from observing others one forms an idea of how new behaviors are performed, and on later occasions this coded information serves as a guide for action' (Bandura 1977, p. 22).</p>

Literature Themes	Findings from the <i>Data</i>	Data <i>Converging</i> with the Literature	Data <i>Diverging</i> from the Literature
<p>moves from generalisation and abstract conceptualisation to active experimentation, on to concrete experience, and then to observation and reflection. A cognitive apprenticeship ‘... supports learning in a domain by enabling students to acquire, develop and use cognitive tools in authentic domain activity’ (Brown, Collins &amp; Duguid 1989, p. 39).</p> <p><u>Social Learning</u></p> <p>The accepted view of social learning is ‘... organizational participants learn how to behave from observing those around them’ (Davis &amp; Luthans 1980, p. 284) as a ‘... source for learning new behaviors [sic] and for accomplishing behavioral change in organizational settings’ (Sims &amp; Manz 1982, p. 62). Effective processes and strategies may contribute to the sharing and retention of corporate knowledge within organisations and can include (Warne, Ali &amp; Pascoe 2003, p. 58):</p> <ul style="list-style-type: none"> <li>• Organisational Culture</li> <li>• Job Satisfaction and Morale</li> <li>• Information and Knowledge and Support</li> <li>• Team Building</li> <li>• Professional Development</li> </ul>			

Literature Themes	Findings from the <i>Data</i>	Data <i>Converging</i> with the Literature	Data <i>Diverging</i> from the Literature
<p><b>Knowledge Drivers</b></p> <p><u>Skill and Competency</u></p> <p>Competency is a standard to measure skill against and can be represented by four phases of competency development (Flower 1999).</p>	<p>The data indicated the research participants may not have understood the subtle difference between skill and competency, although they saw a definite link between skill and the knowledge required to work on their projects.</p> <p><i>'The engineering <b>skills</b> that were required and a desire to have people who were more capable of project management' (Whiskey).</i></p> <p><i>'De-emphasis on the engineering <b>skills</b>' (Whiskey).</i></p> <p><i>'Then learned over time as I did more of the managerial pieces to refine my organisational <b>skills</b> around it' (Mike).</i></p> <p><i>'He helped a number of us actually develop <b>skills</b> and putting thoughts together in a way that could convince other people of the strength in an argument' (Whiskey).</i></p> <p><i>'Then in parallel with that we give them a set suite of soft <b>skills</b> training in terms of negotiating, critical conversations' (Whiskey).</i></p>	<p>Skills represent an individual's ability to work on required tasks against agreed measures of competency. Four phases of competency described by Flower (1999, p. 64) can be seen in the data as the research participants explained their own development in similar stages. These stages included moving from an unconsciously unskilled 'Spectator', to a consciously unskilled 'Student', to a consciously skilled 'Facilitator', and finally to an unconsciously skilled 'Leader'.</p>	<p>Although the data did not directly refer to competency as defined in the literature, it was inferred competency was represented in the qualifications and experiences required to undertake the work within specific standards. Competencies are '... individual and measurable skills demonstrated and assessed against agreed standards of competence' (Cairns 2000, p. 2). These standards describe '... performance criteria for workplace performance' (Crawford et al. 2006, p. 723).</p>

## Appendix 5–Divergence and Convergence between Social Exchange Theory and the Literature and Data

<b>Data Converging with the Social Exchange Theory Literature</b>	<b>Data Diverging from the Social Exchange Theory Literature</b>	<b>Convergence of Literature and Data with Social Exchange Theory</b>	<b>Divergence of Literature and Data with Social Exchange Theory</b>	<b>Can the Theory be Confirmed or Extended?</b>
<b>Knowledge Acquisition: <i>Explicit</i></b>  <u>Systems Approach</u> : orderly repository for explicit knowledge generated from project work.	No divergence of data evident.	Not directly addressed in the theory.	No divergence of data or literature evident.	No
<u>Apprenticeships</u> : insufficient data available.	No divergence of data evident.	Not directly addressed in the theory.	No divergence of data or literature evident.	No
<u>Coaching and Mentoring</u> : formal and informal programs have direct and positive impact.	No divergence of data evident.	Not directly addressed in the theory.	No divergence of data or literature evident.	No
<b>Knowledge Acquisition: <i>Tacit</i></b>  <u>Personal Knowledge</u> : not evident in the data.	No divergence of data evident.	Not directly addressed in the theory.	No divergence of data or literature evident.	No
<u>Storytelling</u> : purposeful role of the storyteller sharing context-specific information.	No divergence of data evident.	Not directly addressed in the theory.	No divergence of data or literature evident.	No
<u>Reflection</u> : make sense of a situation using past experiences.	No divergence of data evident.	Not directly addressed in the theory.	No divergence of data or literature evident.	No



<b>Data Converging with the Social Exchange Theory Literature</b>	<b>Data Diverging from the Social Exchange Theory Literature</b>	<b>Convergence of Literature and Data with Social Exchange Theory</b>	<b>Divergence of Literature and Data with Social Exchange Theory</b>	<b>Can the Theory be Confirmed or Extended?</b>
<p><u>Communities of Practice</u>: benefit to a current project, dissolved when focus changes, unless formally established within or external to the organisation.</p> <p><i>'There's a [internal] young professionals network set up. We try and get people together to share their experiences' (Whiskey).</i></p>	<p>No divergence of data evident.</p>	<p>Exchange can occur in a direct or indirect network '... involving many actors, both corporate groups and individuals' (Emerson 1976, p. 359). Coalitions can be formed to balance the exchanges (Cook &amp; Gillmore 1984).</p>	<p>No divergence of data or literature evident.</p>	<p><b>Extend</b></p> <p>The formation of communities of practice to exchange tacit knowledge among individuals. This can occur through a direct or indirect network of influence leading to the exchange of tangible and intangible assets.</p>
<p><b>Knowledge Exchange:</b></p> <p><u>Knowledge Exchange</u>: key people engage with the project to deliberately and systematically exchange knowledge, often in a social interaction.</p> <p><i>'Information shared is better than information retained' (Whiskey).</i></p>	<p><i>Ad hoc</i> interactions lead to beneficial outcomes not supported in literature.</p>	<p>Negotiated reciprocal transaction of tangible or intangible assets between parties.</p>	<p>No divergence of data or literature evident.</p>	<p><b>Confirm</b></p> <p>Social, or tacit, exchange of tangible assets in a systematic way.</p>
<p><u>Performance Improvement</u>: can lead to demonstrated success by adopting a formalised</p>	<p>No divergence of data evident.</p>	<p>Not directly addressed in the theory.</p>	<p>No divergence of data</p>	<p>No</p>

<b>Data Converging with the Social Exchange Theory Literature</b>	<b>Data Diverging from the Social Exchange Theory Literature</b>	<b>Convergence of Literature and Data with Social Exchange Theory</b>	<b>Divergence of Literature and Data with Social Exchange Theory</b>	<b>Can the Theory be Confirmed or Extended?</b>
structure to benchmark results.			or literature evident.	
<u>Knowledge Conversion</u> : insufficient data available, as study focused on exchange not conversion.	No divergence of data evident.	Not directly addressed in the theory.	No divergence of data or literature evident.	No
<b>Knowledge Environment:</b>  <u>Physical and Virtual Environments</u> : require established protocols to manage expectations. Create informal environments to understand cultural and political impacts, although minimal influence over what type of environment can be created.	Divergence where environments are created reactively due to external technical or political pressures.	Not directly addressed in the theory.	No divergence of data or literature evident.	No
<u>Organisational Barriers</u> : include lack of support and leadership, misunderstandings from lack of knowledge, and organisational culture.  <i>'It's just a bit of a <b>roadblock</b> as well. It stops you kind of progressing. It just stalls you unnecessarily' (Sierra).</i>	No divergence of data evident.	Power-dependent relations may '... create inequalities ... that can lead to conflict and social change' (Molm 2001, p. 262).	No divergence of data or literature evident.	<b>Confirm</b>  Where conflict is evident in relationships it can create a barrier to knowledge exchange.

<b>Data Converging with the Social Exchange Theory Literature</b>	<b>Data Diverging from the Social Exchange Theory Literature</b>	<b>Convergence of Literature and Data with Social Exchange Theory</b>	<b>Divergence of Literature and Data with Social Exchange Theory</b>	<b>Can the Theory be Confirmed or Extended?</b>
<p><u>Organisational Enhancers</u>: created through a common purpose, valuing knowledge sharing, creating opportunities for contact, recognising and capturing tacit knowledge, and building into work practices.</p> <p><i>‘Out of this influence at an organisational level how we might <b>not create barriers</b> to knowledge exchange. I’m not going as far as thinking about what might positively encourage it, but what we might be able to do to eliminate barriers’ (Whiskey).</i></p>	<p>No divergence of data evident.</p>	<p>‘... patterns of dependence provide the structural foundation ... [to] ... bring people together’ (Molm 2001, p. 262). High level of trust promoted where ‘... exchange [occurs] under risk and uncertainty’ (Molm 2001, p. 268).</p>	<p>No divergence of data or literature evident.</p>	<p><b>Confirm</b></p> <p>Intergroup dependency and trust enables knowledge exchange to occur.</p>
<p><b>Knowledge Drivers:</b></p> <p><u>Personality, Motivation and Behaviours</u>: influenced by organisational culture, instinct, leadership, and team dynamics.</p> <p><i>‘They were very much focused on <b>behaviours</b> and signs of behaviour and influencing behaviour’ (Mike).</i></p>	<p>No divergence of data evident.</p>	<p>Exchange requires ‘... dependence on others, either by obtaining rewards or avoiding punishment’ (Molm 2001, p. 265). Lawler (1992) posits there is a conscious use of power tactics when deciding how an agreement will be reached.</p>	<p>No divergence of data or literature evident.</p>	<p><b>Confirm</b></p> <p>Motivation to exchange knowledge depends on the behaviour of an individual and the impact of group dynamics.</p>

<b>Data <i>Converging</i> with the Social Exchange Theory Literature</b>	<b>Data <i>Diverging</i> from the Social Exchange Theory Literature</b>	<b><i>Convergence</i> of Literature and Data with Social Exchange Theory</b>	<b><i>Divergence</i> of Literature and Data with Social Exchange Theory</b>	<b>Can the Theory be <i>Confirmed</i> or <i>Extended</i>?</b>
<u>Learning Styles, Experiential and Social Learning:</u> learn through experience and observations.	Lack planning to exploit learning opportunities.	Not directly addressed in the theory.	No divergence of data or literature evident.	No
<u>Skill and Competency:</u> skills represent a capacity to work on required tasks against agreed competency measures. Data inferred competency was measured against standards of qualification and experience.	No divergence of data evident.	Not directly addressed in the theory.	No divergence of data or literature evident.	No

## Appendix 6–Divergence and Convergence between the Theory of Action and the Literature and Data

<b>Data Converging with the Theory of Action Literature</b>	<b>Data Diverging from the Theory of Action Literature</b>	<b>Convergence of Literature and Data with Theory of Action</b>	<b>Divergence of Literature and Data with Theory of Action</b>	<b>Can the Theory be Confirmed or Extended?</b>
<b>Knowledge Acquisition: <i>Explicit</i></b> <u>Systems Approach</u> : orderly repository for explicit knowledge generated from project work.	No divergence of data evident.	Not directly addressed in the theory.	No divergence of data evident.	No
<u>Apprenticeships</u> : insufficient data available.	No divergence of data evident.	Not directly addressed in the theory.	No divergence of data evident.	No
<u>Coaching and Mentoring</u> : formal and informal programs have direct and positive impact.	No divergence of data evident.	Not directly addressed in the theory.	No divergence of data evident.	No
<b>Knowledge Acquisition: <i>Tacit</i></b> <u>Personal Knowledge</u> : not evident in the data.	No divergence of data evident.	Not directly addressed in the theory.	No divergence of data evident.	No
<u>Storytelling</u> : purposeful role of the storyteller sharing context-specific information.	No divergence of data evident.	Not directly addressed in the theory.	No divergence of data evident.	No
<u>Reflection</u> : make sense of a situation using past experiences.	No divergence of data evident.	Not directly addressed in the theory.	No divergence of data evident.	No

<b>Data Converging with the Theory of Action Literature</b>	<b>Data Diverging from the Theory of Action Literature</b>	<b>Convergence of Literature and Data with Theory of Action</b>	<b>Divergence of Literature and Data with Theory of Action</b>	<b>Can the Theory be Confirmed or Extended?</b>
<u>Communities of Practice</u> : benefit to a current project, dissolved when focus changes, unless formally established within or external to the organisation.	No divergence of data evident.	Not directly addressed in the theory.	No divergence of data evident.	No
<b>Knowledge Exchange</b> <u>Knowledge Exchange</u> : key people engage with the project to deliberately and systematically exchange knowledge, often in a social interaction.  <i>'I've <b>shared</b> the information and hung out the dirty linen. Which you should do on bad projects' (Bravo).</i>	<i>Ad hoc</i> interactions lead to beneficial outcomes not supported in literature.	The development of a 'social reality' to manage work within the 'organisational reality' requires individuals to understand '... actual practices and not their formal descriptions' (Klev & Levin 2012, p. 84).	No divergence of data evident.	<b>Confirm</b>  Actual practice of knowledge exchange occurs in a social context.
<u>Performance Improvement</u> : can lead to demonstrated success by adopting a formalised structure to benchmark results.	No divergence of data evident.	Not directly addressed in the theory.	No divergence of data evident.	No
<u>Knowledge Conversion</u> : no data as study focused on exchange not conversion.	No divergence of data evident.	Not directly addressed in the theory.	No divergence of data evident.	No

<b>Data <i>Converging</i> with the Theory of Action Literature</b>	<b>Data <i>Diverging</i> from the Theory of Action Literature</b>	<b><i>Convergence</i> of Literature and Data with Theory of Action</b>	<b><i>Divergence</i> of Literature and Data with Theory of Action</b>	<b>Can the Theory be <i>Confirmed</i> or <i>Extended</i>?</b>
<p><b>Knowledge Environment</b></p> <p><u>Physical and Virtual Environments</u>: require established protocols to manage expectations. Create informal environments to understand cultural and political impacts, although minimal influence over what type of environment can be created.</p> <p>‘It was a <b><i>conversation over lunch</i></b> where you really got the whole story, the big picture and what really went on’ (Delta).</p>	<p>Divergence where environments are created reactively due to external technical or political pressures.</p>	<p>‘... the organization [...] is shaped and changed by learning processes over time’ (Klev &amp; Levin 2012, p. 25).</p>	<p>No divergence of data evident.</p>	<p><b>Confirm</b></p> <p>Organisations react to change which results in an environment being created through various impacts.</p>
<p><u>Organisational Barriers</u>: include lack of support and leadership, misunderstandings from lack of knowledge, and organisational culture.</p>		<p>Not directly addressed in the theory.</p>	<p>No divergence of data evident.</p>	<p>No</p>
<p><u>Organisational Enhancers</u>: created through a common purpose, valuing knowledge sharing, creating opportunities for contact, recognising and capturing tacit knowledge, and building into work practices.</p>	<p>No divergence of data evident.</p>	<p>Not directly addressed in the theory.</p>	<p>No divergence of data evident.</p>	<p>No</p>

Data <i>Converging</i> with the Theory of Action Literature	Data <i>Diverging</i> from the Theory of Action Literature	<i>Convergence</i> of Literature and Data with Theory of Action	<i>Divergence</i> of Literature and Data with Theory of Action	Can the Theory be <i>Confirmed</i> or <i>Extended</i> ?
<p><b>Knowledge Drivers</b></p> <p><u>Personality, Motivation and Behaviours:</u> influenced by organisational culture, instinct, leadership, and team dynamics.</p> <p><i>‘Being able to adjust your <b>behaviour</b> and your communications and having the balls to make decisions and take a risk’ (Bravo).</i></p>	<p>No divergence of data evident.</p>	<p>‘The behaviour of individuals varied widely, but the theory they used to design and implement the behaviour did not vary’ (Argyris 1995, p. 21).</p>	<p>No divergence of data evident.</p>	<p><b>Extend</b></p> <p>Applying the ToA to project managers could <b>extend</b> the theory based on the difference in an individual’s behaviour at various times when managing projects.</p>
<p><u>Learning Styles, Experiential and Social Learning:</u> learn through experience and observations.</p> <p><i>‘Continuing to <b>ask questions</b> and poke at this from different angles until you come up with your self-discovery’ (Mike).</i></p>	<p>No divergence of data evident.</p>	<p>‘... the individual is key to organizational learning because it is the thinking and acting of individual practitioners that produces learning’ (Argyris 1995, p. 26).</p>	<p>No divergence of data evident.</p>	<p><b>Confirm</b></p> <p>Individuals learn through experiences and observations which in turn create organisational learning.</p>
<p><u>Skill and Competency:</u> skills represent a capacity to work on required tasks against agreed competency measures. Data inferred competency was measured against standards of qualification and experience.</p>	<p>Lack planning to exploit learning opportunities.</p>	<p>Not directly addressed in the theory.</p>	<p>No divergence of data evident.</p>	<p>No</p>



## Appendix 7–Divergence and Convergence between the Theory of Reasoned Action and the Literature and Data

Data <i>Converging</i> with the Theory of Reasoned Action Literature	Data <i>Diverging</i> from the Theory of Reasoned Action Literature	<i>Convergence</i> of Literature and Data with Theory of Reasoned Action	<i>Divergence</i> of Literature and Data with Theory of Reasoned Action	Can the Theory be <i>Confirmed</i> or <i>Extended</i> ?
<b>Knowledge Acquisition: <i>Explicit</i></b> <u>Systems Approach</u> : orderly repository for explicit knowledge generated from project work.	No divergence of data evident.	Not directly addressed in the theory.	No divergence of data evident.	No
<u>Apprenticeships</u> : insufficient data available.	No divergence of data evident.	Not directly addressed in the theory.	No divergence of data evident.	No
<u>Coaching and Mentoring</u> : formal and informal programs have direct and positive impact.	No divergence of data evident.	Not directly addressed in the theory.	No divergence of data evident.	No
<b>Knowledge Acquisition: <i>Tacit</i></b> <u>Personal Knowledge</u> : insufficient data available.	No divergence of data evident.	Not directly addressed in the theory.	No divergence of data evident.	No
<u>Storytelling</u> : purposeful role of the storyteller sharing context-specific information.	No divergence of data evident.	Not directly addressed in the theory.	No divergence of data evident.	No
<u>Reflection</u> : make sense of a situation using	No divergence of data	Not directly addressed in the	No divergence of data	No

<b>Data <i>Converging</i> with the Theory of Reasoned Action Literature</b>	<b>Data <i>Diverging</i> from the Theory of Reasoned Action Literature</b>	<b><i>Convergence</i> of Literature and Data with Theory of Reasoned Action</b>	<b><i>Divergence</i> of Literature and Data with Theory of Reasoned Action</b>	<b>Can the Theory be <i>Confirmed</i> or <i>Extended</i>?</b>
past experiences.	evident.	theory.	evident.	
<u>Communities of Practice</u> : benefit to a current project, dissolved when focus changes, unless formally established within or external to the organisation.	No divergence of data evident.	Not directly addressed in the theory.	No divergence of data evident.	No
<b>Knowledge Exchange</b>  <u>Knowledge Exchange</u> : key people engage with the project to deliberately and systematically exchange knowledge, often in a social interaction.	<i>Ad hoc</i> interactions lead to beneficial outcomes not supported in literature.	Not directly addressed in the theory.	No divergence of data evident.	No
<u>Performance Improvement</u> : can lead to demonstrated success by adopting a formalised structure to benchmark results.  <i>'I suppose having discussions and bringing together our knowledge around the <b>improvements</b> which we could do and how we could change things and formalise things' (Sierra).</i>	No divergence of data evident.	'... was developed to deal with behaviors and not outcomes or events that result from behaviors' (Sheppard, Hartwick & Warshaw 1988, p. 326). Also does not account for how goals are determined, and what the consequences are if the goals are not achieved.	No divergence of data evident.	<b>Extend</b>  Understanding the implications of making informed decisions about determining goals or outcomes could <b>extend</b> the ToRA.

<b>Data Converging with the Theory of Reasoned Action Literature</b>	<b>Data Diverging from the Theory of Reasoned Action Literature</b>	<b>Convergence of Literature and Data with Theory of Reasoned Action</b>	<b>Divergence of Literature and Data with Theory of Reasoned Action</b>	<b>Can the Theory be Confirmed or Extended?</b>
<u>Knowledge Conversion</u> : no data as study focused on exchange not conversion.	No divergence of data evident.	Not directly addressed in the theory.	No divergence of data evident.	No
<b>Knowledge Environment</b> <u>Physical and Virtual Environments</u> : require established protocols to manage expectations. Create informal environments to understand cultural and political impacts, although minimal influence over what type of environment can be created.	Divergence where environments are created reactively due to external technical or political pressures.	Not directly addressed in the theory.	No divergence of data evident.	No
<u>Organisational Barriers</u> : include lack of support and leadership, misunderstandings from lack of knowledge, and organisational culture.	No divergence of data evident.	Not directly addressed in the theory.	No divergence of data evident.	No
<u>Organisational Enhancers</u> : created through a common purpose, valuing knowledge sharing, creating opportunities for contact, recognising and capturing tacit knowledge, and building into work practices.	No divergence of data evident.	Not directly addressed in the theory.	No divergence of data evident.	No

<p align="center"><b>Data Converging with the Theory of Reasoned Action Literature</b></p>	<p align="center"><b>Data Diverging from the Theory of Reasoned Action Literature</b></p>	<p align="center"><b>Convergence of Literature and Data with Theory of Reasoned Action</b></p>	<p align="center"><b>Divergence of Literature and Data with Theory of Reasoned Action</b></p>	<p align="center"><b>Can the Theory be Confirmed or Extended?</b></p>
<p><b>Knowledge Drivers</b></p> <p><u>Personality, Motivation and Behaviours:</u> influenced by organisational culture, instinct, leadership, and team dynamics.</p> <p><i>'It's just the sort of <b>behaviours</b> that are being identified that describe the <b>culture</b> we want into the future is about openness and sharing of information' (Whiskey).</i></p>	<p>No divergence of data evident.</p>	<p>Predicts behavioural intention as a result of both individual and normative influences, where '... a person's intention to perform (or not to perform) a behaviour is the immediate determinant of that action' (Ajzen 2005, p. 117).</p> <p>'Beliefs influence attitudes and subjective norms; these two components influence intentions; and intentions influence behaviour' (Ajzen &amp; Fishbein 1980, p. 80).</p>	<p>No divergence of data evident.</p>	<p><b>Extend</b></p> <p>Extending the ToRA to encompass the influence of an organisation, or multi-unit entity, on an individual behaviour could elicit a further application of this theory.</p>
<p><u>Learning Styles, Experiential and Social Learning:</u> learn through experience and observations.</p>	<p>Lack planning to exploit learning opportunities.</p>	<p>Not directly addressed in the theory.</p>	<p>No divergence of data evident.</p>	<p>No</p>
<p><u>Skill and Competency:</u> skills represent a capacity to work on required tasks against agreed competency measures. Data inferred competency was measured against standards of qualification and experience.</p>	<p>No divergence of data evident.</p>	<p>Not directly addressed in the theory.</p>	<p>No divergence of data evident.</p>	<p>No</p>

## Chapter 6: Conclusions and Implications

*'All our knowledge begins with the senses, proceeds then to the understanding, and ends with reason. There is nothing higher than reason.'*

Immanuel Kant, German philosopher (1724-1804)

### 6.1 Introduction

I bring to a conclusion the answers to the primary and secondary research questions addressed in this study and the contributions from my findings. The primary question asks how project managers acquire knowledge and how they exchange knowledge. The secondary question is aimed at uncovering what knowledge sources are used to acquire and exchange project management knowledge. The justification for the research is given and the contributions to theory, methodology, practice, and policy are presented. Limitations of the study are concluded and several areas for further research are identified. Finally I close with some personal reflections on the research.

### 6.2 Response to the Research Questions

The research questions were articulated in 'Chapter 3: Research Methodology and Methods' were designed to examine how project managers acquire and exchange knowledge as they work in a project environment. To address this concern, the following primary research questions were initially prepared for the study:

- How do project managers *acquire* project management knowledge?
- How do project managers *exchange* project management knowledge?

A secondary research question was also initially prepared to identify:

- What are the knowledge *sources* the project managers use to *acquire* and/or *exchange* project management knowledge?

To respond to these primary and secondary research questions I reframed the questions to focus specifically on four key themes I had identified from a review of the literature:

1. WHAT are the sources of knowledge? This leads to an examination of how project managers *acquire knowledge*.

2. HOW does knowledge exchange happen? This leads to an examination of how project managers *exchange knowledge*.
3. WHERE does knowledge exchange happen? This leads to an examination of the project management *environment*.
4. WHO makes knowledge exchange happen? This leads to an examination of what *drives* knowledge exchange.

The analysis of the data compared to these four key themes of knowledge acquisition, exchange, the environment and drivers, and the theories of social exchange, action, and reasoned action, is the focus of the following responses to the four focused research questions.

### **6.2.1 How Project Managers Acquire Knowledge**

A comparison of the data to the reviewed literature provides a link to the claim that project managers acquire their knowledge through practical experiences which are integrated with their formal training in an informal way. The implicit acquisition of knowledge was linked to storytelling, reflection, and informal communities of practice. The links between the data and literature diverged on the use of formal systems and apprenticeships being used to explicitly acquire knowledge, and in the implicit form of personal knowledge referred to as the project manager's instinct or intuition. The convergence between the data and the literature suggesting the predominant form of explicit knowledge acquisition is through informal relationships that guide and mentor the individual project manager. Social Exchange Theory was the only theory supporting the findings in this research area, confirming communities of practice can be formed by a network of individuals and groups to encourage the acquisition and exchange of knowledge.

### **6.2.2 How Project Managers Exchange Knowledge**

I compared what each research participant *said* they did to exchange knowledge, with what they actually *did* to exchange knowledge through direct observation, against what their work colleague *said* they did. When I reviewed the data from my observations and the interviews with the research participants, the leading category for how the entire group exchanged knowledge was classified as *impersonal* and *formal*. However, in the interviews with the work colleagues they consistently expressed a view their research participant exchanged knowledge in an *impersonal* and *informal* manner. The six separate work colleagues, who were located in different organisations, and interviewed at different times, to all indicate one particular

category and completely align with each other but not with the research participant would indicate perhaps other influencing factors. When analysing individual data from my observations, *impersonal* and *formal* again were the leading categories for five out of six research participants. The individual interview data show that four of six of the research participants also exchanged knowledge in an *impersonal* and *formal* manner. In all cases the data from the work colleague did not match my observations. In five out of six cases, the work colleague's view of how their research participant exchanged knowledge again did not align with what the research participant said they did to exchange knowledge.

When I examined the theories selected for comparison to the data and literature, I found Social Exchange Theory supports the data and the relevant literature, where knowledge exchange occurs through negotiated reciprocal transactions of tangible or intangible assets between parties. The Theory of Action suggests the development of a social reality to manage work within an organisational reality requiring individuals to understand '... actual practices and not their formal descriptions' (Klev & Levin 2012, p. 84). The Theory of Reasoned Action can support knowledge exchange as it is underpinned by behaviours, and not the expected outcome or result, or possibly an asset, as suggested by Social Exchange Theory.

### **6.2.3 What knowledge sources are used to acquire and/or exchange project management knowledge?**

The secondary research question was not answered in the study as I could not find any data to align to the literature. Therefore, I moved on to explore the environment and drivers to knowledge acquisition and exchange when managing projects. The physical and virtual environment in which projects are managed can either inhibit or enhance the acquisition and exchange of knowledge. The research participants create informal spaces to manage projects as a reaction to a culture that was not supportive of knowledge exchange practices, or in some cases was too structured, requiring complete compliance. When examining the drivers motivating the research participants to acquire and exchange knowledge, it was evident intuitive behaviour reflected their individual personality, and at the same time, the culture of the organisation.

## **6.3 Justification**

The study was justified through my desire to pursue an academic investigation into the impact of knowledge practices on the management of projects. This desire was confirmed by the

research participants who also believe systematic research will lead to insights which may improve their capability as project managers.

The justification for the research supporting how project managers acquire and exchange knowledge is based on two areas. The first is within the pursuit of knowledge with an academic base to influence practice. The lack of literature available in the project management domain for the research questions created the catalyst to explore this research concern. Through engagement with project managers, initially as research informants and then partners in the research, the study appeared ‘... to ‘grow’ out of the discussion as gaps in the body of knowledge are discovered.’ (Perry 2002, p. 23). I have included Figure 37 below from ‘Chapter 4: Data Collection and Analysis’ to illustrate how the role of the research participants evolved in the study from Research Informants to Research Partners. The reasons for the research became more relevant to the research participants over time as several were conducting reviews into knowledge loss in their organisations.

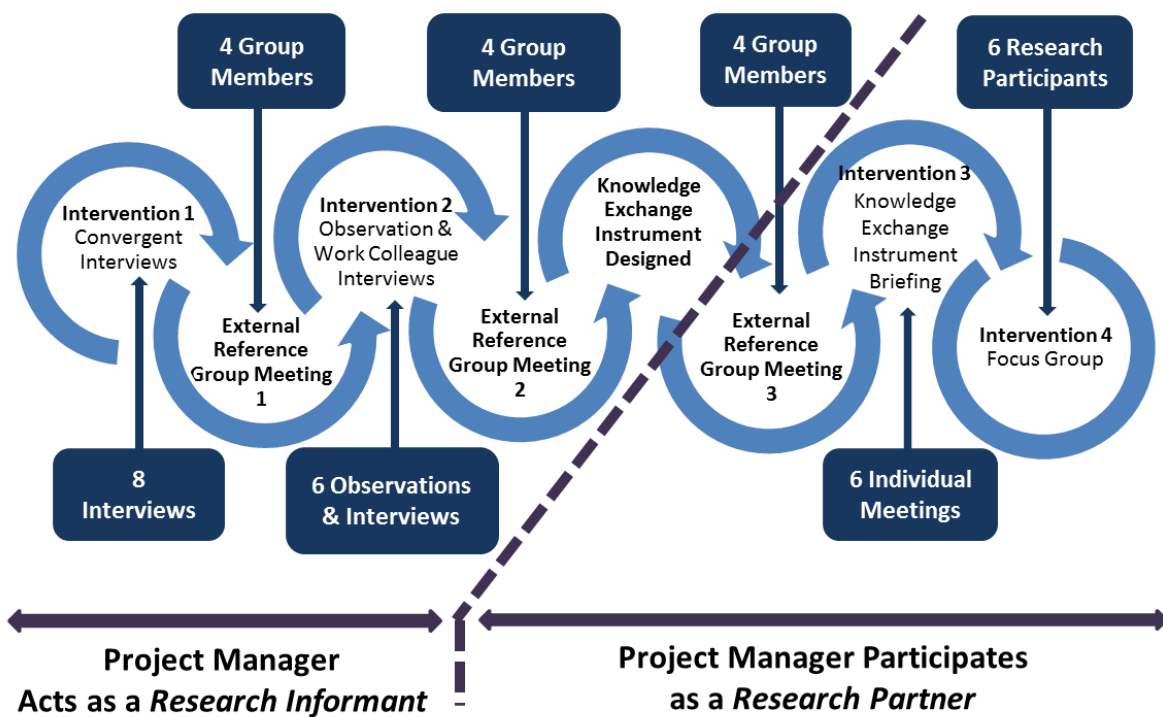


Figure 37: Evolution of the role of the research participant from research informant to research partner

The second area of justification is based on reflections I captured throughout the research, which confirmed the reasons why I undertook this study. The experiences I had had as a practising project manager led me to investigate why there were limited and often inconsistent approaches to acquiring and exchanging knowledge in organisations. I was also curious about the various



environmental impacts I had observed in the project environment, and what drove different approaches to the acquisition and exchange of knowledge. When I collected the data throughout the study I kept detailed notes which I used after the interactions with the research participants to write up my reflections. It became evident through reflective data analysis that several consistent themes were emerging. The themes are the value of practical experiences combined with formal training to informally acquire and exchange knowledge in a predominantly impersonal and formal manner.

These themes aligned to why the research participants inadvertently exchanged, at least partially, their knowledge with me so I understood the context of their work and behaviours. I also examined various project artefacts, such as project plans, meeting minutes, and presentations. Separately, at times the research participants would also seek my advice on a project or career issue. The research participants also justified the time spent on this study as they perceived it would lead to improvement in their own capabilities and insights.

## **6.4 Research Contributions**

I have used the interpretivist approach to make sense of the dynamic project environments in which the research participants acquire and exchange knowledge. I will demonstrate the significance of my research through the impact it may have on theory, methodology, practice and policy. The research addresses three interpretivist perspectives Voce (2004) posits according to ontology, epistemology and methodology, as follows:

- **Ontological Perspective**
  - Definition: People interpret reality in different ways through their direct and indirect interactions that are subjective and imperfect.
  - Research: I understood my interpretations may be subjective so I designed the research method to collect data from interviews and observations involving the research participants, and interviews with their work colleagues. The focus group and reflective journals were another medium for the research participants to contribute to the study in direct and indirect ways.
- **Epistemological Perspective**
  - Definition: People make meaning through observing and constructing knowledge based on subjective beliefs, values, reasons, and understandings.
  - Research: I came to the study with 20 years experience working as a project manager, which drove my desire to address the issue of knowledge loss. To manage the possible influence this experience may have on my understanding

of the research I used a reflective journal throughout the study. I also asked the research participants to use reflective journals, which gave all of us a medium to understand the meaning behind our actions.

- Methodological Perspective
  - Definition: To capture people's knowledge, action research is conducted in natural settings using a cyclical approach to observe, interview, and analysis discourse.
  - Research: I engaged with the research participants in their workplace and conducted open interviews before observing their actions *in situ*. I analysed the data based on a grounded theory technique that involved coding words, sentences, and paragraphs to identify themes for each intervention, which I then compared between what the research participant said they did, what I observed them doing, and what their work colleagues said they did to exchange knowledge.

I have summarised the contributions to theory, methodology, practice, and policy according to the literature and my contributions from this research in Table 27 below.

Table 27: Research contributions to theory, methodology, practice, and policy according to the literature and the research

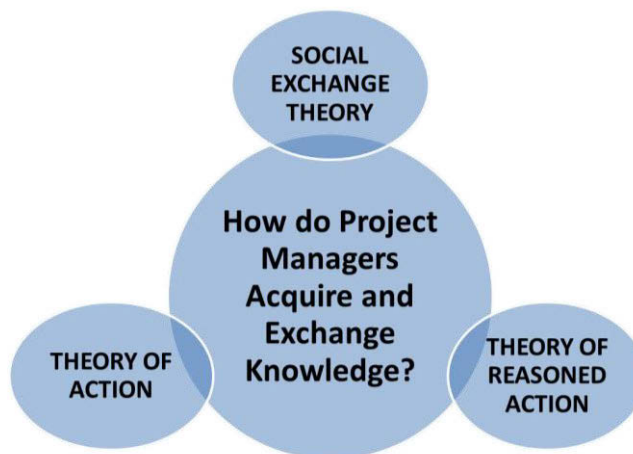
Research Contribution Issues	Status of Research in the Extant Literature	Contribution of this Research
<p><b>RCI – 1</b></p> <p><b>What are the contributions of the research to the theories of social exchange, action, and reasoned action?</b></p>	<p>There is minimal evidence of the application of the three theories in the project management literature.</p>	<p><u>An Addition:</u> reviewed SET, ToA, and ToRA in the project management domain.</p>
<p><b>RCI – 2</b></p> <p><b>What are the contributions of this research to action research methodology?</b></p>	<p>There are detailed accounts in the literature of the application of action research to a range of practical issues, although limited coverage in the project management sector.</p>	<p><u>An Addition:</u> application of action research in project management research.</p>
<p><b>RCI – 3</b></p> <p><b>What are the contributions of this research to the practice of project management?</b></p>	<p>The project management literature gives a range of perspectives on knowledge transfer, sharing and exchange, and is predominantly focused at an organisational level. Management literature includes a more thorough examination of the individual perspective, although not in a project context.</p>	<p><u>An Advance:</u> how knowledge is exchanged at the individual project manager level.</p>
<p><b>RCI – 4</b></p> <p><b>What are the contributions of this research to project management policies?</b></p>	<p>There is no evidence of literature on using research to change project management policy in the area of knowledge acquisition or exchange.</p>	<p><u>An Addition:</u> project management policy to reflect how knowledge is acquired and exchanged.</p>

I found through my research I was acutely aware that:

*'... most of our interventions are rare events because the intention is to change the features of the status quo to facilitate learning in domains where it is discouraged and where the discouragement is socially approved through acculturation in social virtues such as caring, support, honesty, and integrity' (Argyris 1995, p. 26).*

### 6.4.1 Contributions to Theory

As there was no one theory of knowledge acquisition or exchange to understand what theory or theories may be able to support the study, I reviewed the theories of social exchange, action, and reasoned action. In 'Chapter 5: Discussion' I described these three theories and how they converged with or diverged from the literature and data, with Figure 38 demonstrating the connection to the primary research questions of how project managers acquire and exchange knowledge:



*Figure 38: Theoretical framework to underpin how project managers acquire and exchange knowledge*

I have developed the following recommendations to further extend the theories I discussed in 'Chapter 5: Discussion' which are relevant to this study:

- Social Exchange Theory
  - Definition: relationships between individuals or groups are based on a subjective cost-benefit analysis of resources with a tangible or intangible value.

- Extension: the formation of communities of practice to exchange tacit knowledge among individual project managers from a direct or indirect network of influence to exchange tangible and intangible assets.
- Theory of Action
  - Definition: links thinking and acting of an individual or organisation to generate solutions through understanding, which in turn leads to learning.
  - Extension: organisational culture, instinct, leadership, and team dynamics influence the personality, motivations and behaviours of individual project managers to acquire and exchange knowledge in a dynamic environment.
- Theory of Reasoned Action
  - Definition: systematic approach to predict behavioural intention as a result of both individual and normative influences, such as beliefs and attitudes.
  - Extension: performance is enhanced through generating social norms to reinforce behaviour so project managers can make informed decisions by adopting a formalised structure against which to measure results.

### **6.4.2 Contributions to Methodology**

The action research method I developed was adopted from Piggot-Irvine's (2001) Problem Resolving Action Research (PRAR) Model. I augmented the PRAR model to include two interventions in the first action research cycle to interview and observe the research participants, and interview their work colleagues. This generated the data to compare what the research participants said they did, with what I observed them doing, and against what their work colleagues said their research participants did to exchange knowledge. Including a focus group to assist in evaluating the implementation of the knowledge exchange instrument, changed the role of the research participant from an informant to a research partner. The changes to the research participants' roles generated a framework for '... liberating discourse to resolve mutual problems and to achieve an emancipatory outcome' (Cardno & Piggot-Irvine 1996, p. 23). Piggot-Irvine's (2001) PRAR Model was originally developed for educational research and by applying this model to project management research I have made a contribution to this methodology. I have included the action research methodology figures

from 'Chapter 3: Research Methodology and Methods' to demonstrate how the approach evolved throughout the study in Figure 39 and Figure 40 below.

The approach I developed to undertake the action research study began with a close alignment to the Problem Resolving Action Research (PRAR) Model designed by Piggot-Irvine (2001, p. 155). I initially used three interventions aligned to three action research cycles examining how project managers acquired and exchanged knowledge, as shown in Figure 39 below. In developing this approach I had underestimated the need for more interaction with the research participants and the external reference group. As an augmentation to the spin-off cycles, I included an external reference group to reflect on the research approach before and after each intervention.

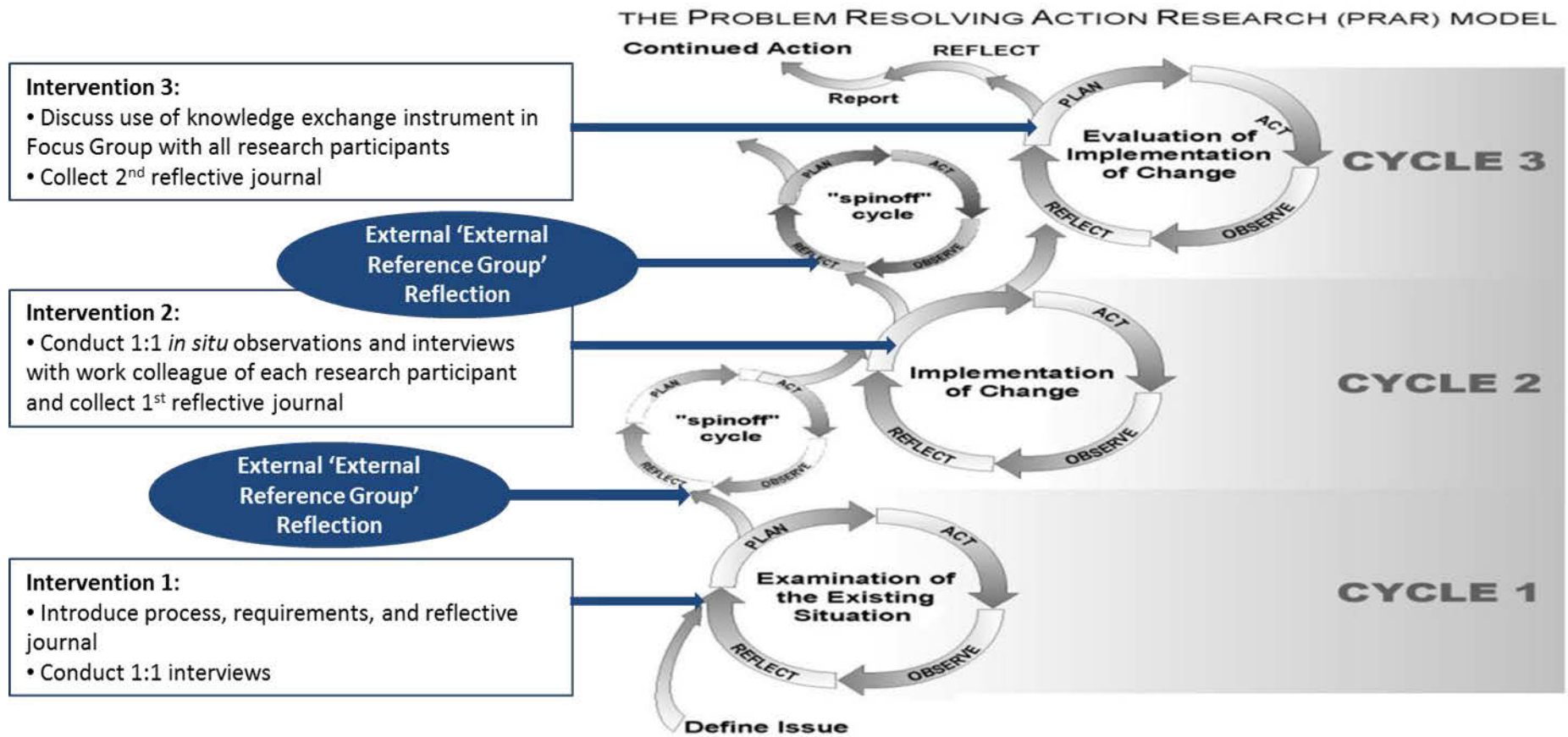


Figure 39: The first iteration of the action research methodology adopted from the Problem Resolving Action Research (PRAR) Model (Piggot-Irvine 2001, p. 155).

As I completed the first intervention it became clear from my own reflections an additional intervention and interaction with the external reference group was required to accommodate the evolving knowledge exchange instrument, as depicted below in Figure 40. The partnership emerging between the external reference group and myself, and separately the research participants and myself, helped transform the PRAR model.

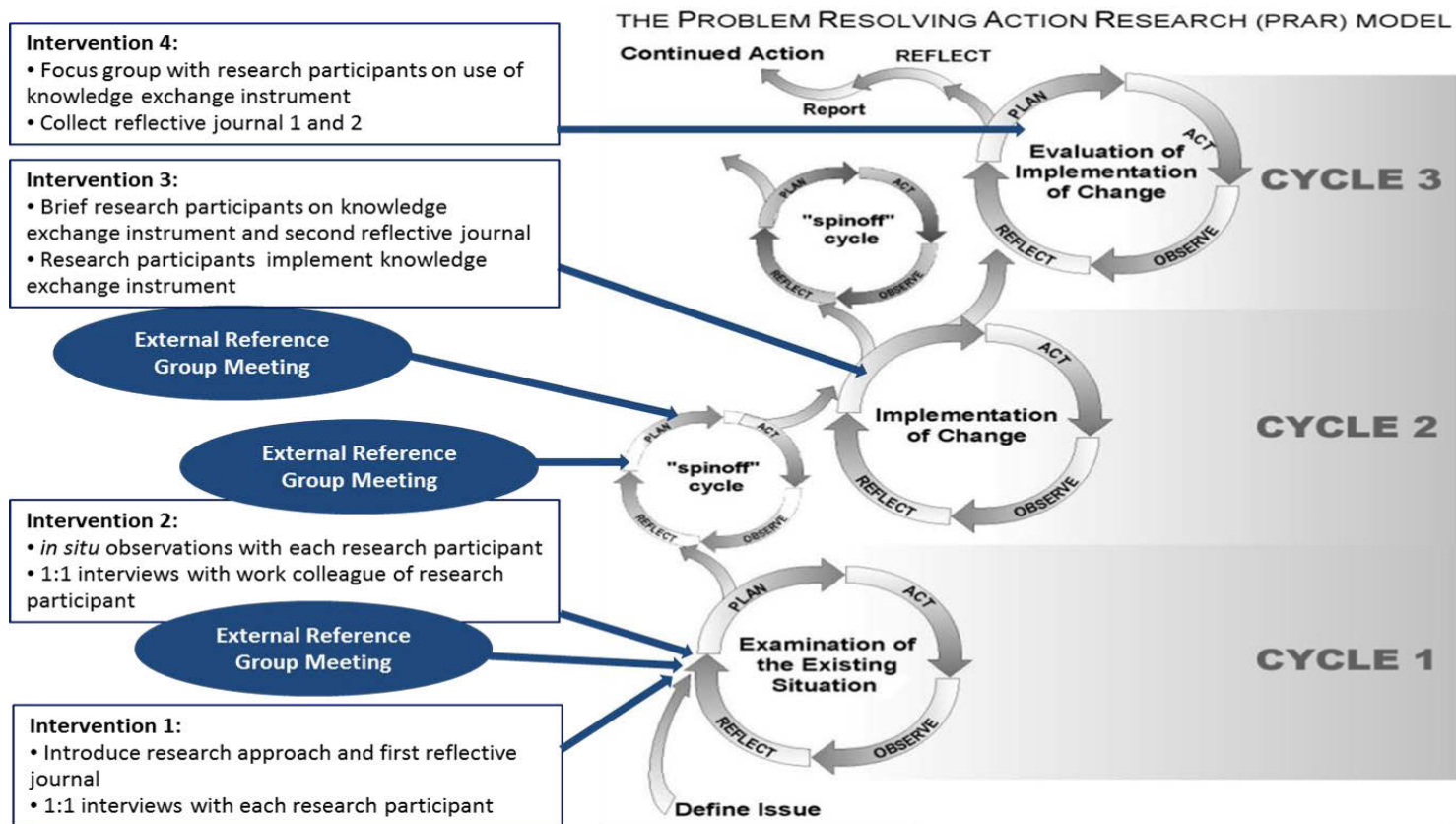


Figure 40: The final iteration of the methodology demonstrating a dynamic change to the action research approach augmenting the Problem Resolving Action Research (PRAR) Model (Piggot-Irvine 2001, p. 155)



### **6.4.3 Contributions to Practice**

The research I have conducted will contribute to practice through creating awareness of how, and providing a structured approach for project managers to acquire and exchange knowledge in a project environment. This way I have demonstrated how to facilitate an improvement in project outcomes through my study of real life situations in the research. The involvement of work colleagues in providing insights into how the research participants exchanged knowledge highlights different perceptions of how knowledge is actually exchanged. These different perceptions may indicate the detail of project management work is not necessarily understood. The research participants reiterated their approach to exchanging knowledge was impersonal and formal, yet their work colleagues suggested they exchanged knowledge informally. This may indicate a need for improved communication protocols while managing projects, as the outcomes reveal project managers may only have a partially informed view of the project environment and requirements, limiting their understanding of how they exchange knowledge.

The knowledge exchange instrument was found to work particularly well in guiding research participants before interactions occurred, and as a reflective tool it was used to review issues arising from their interactions. The research participants used this tool to create personal awareness, agendas, and high level checklists to ensure all aspects of an interaction were captured, as well as using it as a model to develop their own approaches to exchanging knowledge. The discipline of using the knowledge exchange instrument required a structured approach to improve the research participants' practice, which was captured in their reflective journals. The knowledge exchange instrument and reflective journals have an ongoing role in contributing to the research participants practice, as some continue to use these tools to capture knowledge where a large number of colleagues are reaching retirement age within a few years of each other. As stated by one of the research participants '... we have a great focus on knowledge transfer or sharing at this point in time given the number of people in senior positions who will retire within the next two years' (Whiskey). The knowledge exchange instrument presents an opportunity to generate awareness with other project managers to assist them to exchange knowledge.

### **6.4.4 Contributions to Policy**

The research suggests the inclusion of a guided framework for the acquisition and exchange of knowledge in a project environment is required. This framework can be produced in the form

of a policy or guideline by the major professional bodies in Australia as an extension to their existing standards for project management competency. The PMI has produced five editions of the PMBOK® Guide (Project Management Institute 2013), which is often referred to as the international standard for managing projects. The PMBOK® Guide (Project Management Institute 2013) only briefly mentions managing knowledge in a project context in an appendix using Ackoff's (1989) Data, Information, Knowledge, Wisdom model (DIKW) (Project Management Institute 2013, p. 467). The Australian Institute of Project Management (AIPM) offers a competency standard to assess project managers according to the knowledge areas in the PMBOK® Guide (Project Management Institute 2013). However, the AIPM competency standard for managing project knowledge is minimally covered within project communications in the form of a Project Management Information System (PMIS) (Australian Institute of Project Management 2010, p. 20).

Through developing an additional policy using the findings from my research, the project management sector would move towards a more informed approach in the delivery of projects. I would recommend the policy includes:

- An introduction to the benefits of managing knowledge in a project environment.
- A system for recognising the knowledge already acquired by project managers and how to continuously enhance this base.
- A framework for exchanging knowledge in a virtual and physical project environment with a range of engagement options.
- Recommendations for the inclusion of reflective practice while managing projects to identify issues and opportunities for process and personal improvement.
- A structured approach to identify the underlying drivers motivating project managers to exchange knowledge and how these can be enhanced.
- A perspective on how to create a project environment to minimise the barriers so knowledge can be enhanced.

There may be an opportunity to link the knowledge exchange policies suggested for the professional associations with educational practices for teaching project management, as project management courses are predominantly based to the PMBOK® Guide (Project Management Institute 2013), and the AIPM Competency standards (Australian Institute of Project Management 2010).

## 6.5 *Research Limitations and Further Research*

There were several limitations I identified after completing the study which inform the recommendations for further research into how project managers acquire and exchange knowledge. The limitations of the study included: not being able to generalise the findings as it was a narrow, purposeful sample of six research participants; guarding this study against a natural extension into knowledge conversion and learning; and the reduction in focus on the secondary research question due to a lack of data.

To address the contradictions in terms, further research could include the following studies:

- **Study 1:** Engage in a two part study to generalise the research. First, repeat this study and interview and observe Australian based project managers including *in situ* observations with a different demographic than the original research participants, namely less experienced project managers. This study would offer a direct comparison to the original research, providing evidence for less experienced project managers. Second, execute a large survey, with members of the two main project management associations in Australia, to capture a range of experience levels. In the survey gather responses linked to the original interview questions from the original research. This generation of data linked to the interviews in intervention one of this research could allow for comparisons to those similar to the original research participants as well as comparative data to those from different demographic types. This new research could generate data allowing exploration of the experiences and self-perceptions of a national cross section of project managers, promote a better understanding of the full project management community, and guide decisions regarding education and development of a project management curriculum by universities and professional associations.
- **Study 2:** Use the existing methodology in the examination of program or portfolio managers in Australia. This study would potentially enable the generation of information to understand the knowledge acquired and exchanged by those in roles in organisations which manage project managers. Insights into the experiences and nature of this group may generate useful knowledge and tools to improve the operation of these groups in their governance and managerial roles. Using similar questions to intervention one in the original study could generate information on the differences between program and portfolio managers and the project managers of the

original study. This research could generate benefits in improving functionality of program and portfolio managers as well as their governance of project managers.

- **Study 3:** Use the same methodological approach to collect data from multiple work colleagues and at different status levels within the organisation to generate multidimensional perspectives of how the research participant exchanges knowledge. In this study, expand the methodology by adding a focus group meeting where both work colleagues and research participants review differences in perceptions discovered in the original research. The data would generate observations about the differences between these various levels and may result in a tool being developed to better manage communications with and amongst these groups. The literature review would include research into organisations' management and communication areas and could offer benefits to project managers in their management of stakeholders.
- **Study 4:** Conduct the research by industry sector, or by project type, to bring a detailed perspective to benchmark how knowledge is acquired and exchanged specifically in that context. In Australia, particularly in large and traditionally dominant project management industries, such as construction, infrastructure, and resources, as well as newer knowledge based industries, such as technology, medical research, and so on, success of the domestic economy could generate impactful outcomes. A related alternative could be to use the methodology in non-Australian settings or industries.
- **Study 5:** Investigate intra-team knowledge exchange, and development of tools to improve team effectiveness beyond traditional team management approaches suggested in contemporary project management discourse. In particular, might the types of experiences explored in the original study be relevant to team development and effectiveness? This research could advance understanding of practical ways for individuals to work together, by better understanding how information is acquired by team members, within the period of a team's operation, as required for the delivery of a project, and beyond. Information of this type, along with a comprehensive contemporary review of team research, may generate the impetus for new ways to manage temporary teams beyond the PMBOK® Guide's Human Resources chapter (Project Management Institute 2013).
- **Study 6:** Action research methodology to investigate how knowledge exchange can be mapped using Social Network Analysis (SNA) could be used to study '... collective action and social movement [in] organisations' (Sandstrom, Martin & Fine 2001, p. 225). This proposed research may shed light upon the myriad of connections which occur in the course of managing projects. Insights may also be revealed into

networked activities, relationships and sources of knowledge. These could be explored through examination of natural discourse including records of meetings, emails, memos, and so on, in addition to interviews and observations to bring context to any mapping.

Additional research to address the secondary research question could include the following study:

- **Study 7:** The research outcomes from the original study allowed for further exploration of the secondary question, ‘What are the knowledge *sources* the project managers use to *acquire* and/or *exchange* project management knowledge?’ A specific examination of the sources of knowledge for project managers would complement and expand upon the original research. Such research might include not only the sources but how these might be engaged at different times and on different projects due to the temporary nature of single project engagements. Behind this research might be evidence of different information types, utility and applicability, for individual and project managers in differing contexts and at different stages of their career. As such, this research may inform both the nature of the sources as well as the project, and generate a better understanding of how these may impact on acquiring and exchanging knowledge. This study could be further developed into other studies where industry, geography, demographics or other variables are introduced.

In addition, the research could be extended to address new useful practice and include the following approaches:

- **Study 8:** An investigation into how knowledge may be converted using the ‘Parallel Action Learning Structures (PALS) model’ (Passfield 2002, p. 157) to elicit a deeper understanding of how project management capability can be enhanced. The use of a new model may expand the utility of the original research.
- **Study 9:** An examination of useful tools and skills for the project manager, including research into linking the development of knowledge exchange competencies with accompanying skills assessment, selection, and development of project managers. This new research may add to the need for project managers to better manage their teams and stakeholders through improved acquisition and exchange of knowledge. In addition, as demand increases for project management, coupled with team members from a changing workforce (ethnic, gender and social diversity; intergenerational issues; virtual teams, and other forms), and internationalisation and complexity,

improvement in knowledge acquisition and exchange could add to overall effectiveness of project managers.

## **6.6 *Personal Reflections***

After many years in industry and more recently in academia, I observed lost opportunities through the inability of project managers and project management students to exchange knowledge. To begin to address my concerns I focused my research on investigating this issue. I started examining how organisations use projects to deliver strategy. The early literature review led me to look further at the project manager who was at the centre of delivering projects aimed at delivering organisational strategy. To narrow the focus of my study I started to examine how project managers knew what to do – did they already have the knowledge or did they gather what was required as they worked on the project, and how did this happen?

I believe passionately in the value of knowledge, how it is acquired, exchanged, and ideally used to improve what people are working on so they can also empower others to achieve enhanced outcomes. I have been fortunate to have been in a position to design a postgraduate project management subject where students are given permission to exchange knowledge on their own real-life project using a range of tools I developed. These tools include online discussion forums, reflective journals, in-class project progress presentations, and a review of their own professional development plan they prepare for one of their classes. The students enthusiastically develop within this scholarly community of practice, and they engage with each other's projects where they are often surprised at the impact of exchanging knowledge.

During the research I also encountered people in the research participants' organisations who were struggling with how to retain the knowledge leaving their organisation through a large number of retirements, staff turnover and other problems of the organisation. The research I was doing gave these people, as well as the research participants, with a framework for exchanging knowledge, resulting in requests for additional assistance after the research had been completed. This interest in immediate application of my research indicated how relevant the study was to these research participants and their organisations. In undertaking this research my desire is that the development of an approach to understand and facilitate the acquisition and exchange of knowledge will offer a valuable framework for the research participants and one would hope, to the larger community of project managers.

When working on my study I would remind myself of the message in a Rectorial address on the Commemoration Day of the Wesleyan University in Strasburg in 1894, suggesting we must:

*'... have the courage to take a general position ... [and] ... also possess a kind of fortitude that is even more difficult to maintain: the boldness to steer his audience onto the high seas of the most abstract reflections, where the solid earth threatens to vanish from the eye and disappear beneath the feet' (Windelband 1980 (reprint), p. 169).*





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