Adjudicating an Ill-defined Problem from a System Development/Project Management Perspective: Utilizing a Knowledge Management Overlay Model

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Adjudicating an Ill-defined Problem from a System Development/Project Management Perspective: Utilizing a Knowledge Management Overlay Model

A thesis submitted in fulfillment of the requirements for the degree of Doctor of Project Management

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DECLARATION

I certify that except where due acknowledge has been made, the work is that of the author alone; the work has not been submitted previously, in whole or in part, to qualify for any other academic award; the content of the thesis is the result of work, which has been carried out since the official commencement date of the approved research program, and, any editorial work, paid or unpaid, carried out by a third party is acknowledged.

Signed:

David G McKenna MSc., PMP
August 16, 2010
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I want to thank my mother and father who have instilled in me a sense of drive and significance for finishing what I start. They have been with me through this entire journey and have been a powerful influence throughout my entire life. I am what you have made me and I thank you and love you both endlessly.

Thank you to all of my friends and extended family and specifically my life partner, Helen-Ann Younger, for understanding the time commitment for this body of work. They too encouraged me every step of the way and that is truly appreciated.

Finally I want to take this opportunity to thank all those who took part in the research over the course of this thesis. Without your open and honest reflections this would not have been possible.

In memory of my father who lives within me to this day. I miss you, and I love you and this is as much for you as it is for me.
Abstract

Organizations have long struggled with the successful completion of projects within the time, cost and performance indicators with respect to a customer product or solution that is expected to ultimately meet the customer’s expectations. This thesis demonstrates the link between the successful creation, management and dissemination of project requirements throughout the entire project process using a knowledge management overlay model to ensure the success of the overall project to meet stakeholder needs through the successful creation and transfer of project requirements.

The knowledge management overlay model was developed to support the requirements management domain and is the foundation for this research. The knowledge management overlay model is based on the premise that there is a clear need to successfully create, and then transfer the information within a requirement from person to person, team to team, as well as from organization to organization without the loss, distortion or deformation of that content within a project management or system development process. As well, the original ill-defined problem that evolves into a requirement needs to be resolved correctly and accurately at the beginning of a project and is also considered the very underpinning of the requirement process. The goal of the knowledge management overlay model is to ensure a clear and concise creation and transfer of requirements knowledge from inception of the business requirements to the functional product that is presented to the end user and the ability to maintain the fundamental traits and characteristics of the requirements that can get lost during the transfer of knowledge. Once implemented within the project teams and the project management process, the knowledge transfer model will reduce and or eliminate the alteration of content that might otherwise lead to scope creep and substantial re-work as focus is lost on the project vision and objectives. The model will enhance the enablers of successful knowledge transfer and remove the barriers to successful knowledge transfer ultimately increasing project success.
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<td>APM: Agile Project Management</td>
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<tr>
<td>AR: Action Research</td>
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<td>B2B: Business to Business</td>
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<tr>
<td>BA: Business Analyst</td>
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<tr>
<td>BABOK: Business Analysis Body of Knowledge®</td>
</tr>
<tr>
<td>CCT: Culture Change Team</td>
</tr>
<tr>
<td>CEO: Chief Executive Officer</td>
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<tr>
<td>CIT: Continuous Improvement Team</td>
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<tr>
<td>COP: Community of Practice</td>
</tr>
<tr>
<td>CTQ: Critical to Quality</td>
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<tr>
<td>DD: Destructive Distractions</td>
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<tr>
<td>DMAIC: Define, Measure, Analyze, Improve and Control</td>
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<tr>
<td>DPM: Doctor of Project Management</td>
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<tr>
<td>ESPITI: European Software Process Improvement Training Initiative</td>
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<td>F2F: Face-To-Face</td>
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<td>GE: General Electric</td>
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<td>HR: Human Resources</td>
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<tr>
<td>ICT: Information and Communication Technology</td>
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<tr>
<td>IM: Instant Messaging</td>
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<tr>
<td>IP VPN: Internet Protocol Virtual Private Network</td>
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<tr>
<td>IP: Internet Protocol</td>
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<tr>
<td>IPTV: Internet Protocol Television</td>
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<tr>
<td>ISIT: Information System and Information Technology</td>
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<tr>
<td>IT: Information Technology</td>
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<tr>
<td>K/O: Kick Off (Meeting)</td>
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<tr>
<td>KA: Knowledge Articulation</td>
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<tr>
<td>K-bar: Knowledge Transfer Barriers (K-bar)</td>
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<tr>
<td>KC: Knowledge Codification</td>
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<tr>
<td>K-en: Knowledge Transfer Enablers</td>
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KM: Knowledge Management
KT: Knowledge Transfer
LAN: Local Area Network
LPMT: Lean Project Management Team
Mps: Cognitive Mapping
Mr: AR component
NPI: New Product Introduction
NTI: New Technology Introduction
NUMMI: The New United Motor Manufacturing Inc
OL: Organizational Learning
PDA: Personal Digital Assistants
PL: Project Leads
PM: Project Manager
PMBOK®: Project Management Body of Knowledge®
PMI®: Project Management Institute®
PMO: Present Mode of Operation
PMP®: Project Management Professional®
PPP: Public-Private Partnerships
R&D: Research and Development
RAD: Rapid Application Development
RMIT: Royal Melbourne Institute of Technology
S/W: Software
SDLC: System Development Life Cycle
SECI: Socialization, Externalization, Internalization and Combination model
SIGs: Specific Interest Groups
SMB: Small Medium Business
SME: Subject Matter Experts
SRS: System Requirement Specification
SSM: Soft Systems Methodology
T&D: Training and Development
TPS: Toyota Production System
<table>
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<tr>
<th>Acronym</th>
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<tr>
<td>VoIP</td>
<td>Voice over Internet Protocol</td>
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<td>VP</td>
<td>Vice President</td>
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<td>VPN</td>
<td>Virtual Private Network</td>
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<td>VSM</td>
<td>Value Stream Mapping</td>
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<tr>
<td>WAN</td>
<td>Wide Area Network</td>
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<tr>
<td>WBS</td>
<td>Work Breakdown Schedule</td>
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<td>XP</td>
<td>Extreme Programming</td>
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<td>XPM</td>
<td>Extreme Project Management</td>
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Chapter 1 - Introduction

1.0 Introduction

This chapter contains a summary of the subject of discussion and outlines the scope of the thesis. The chapter comprises the research background and rationale for the research. The main focus of this study is to examine the nature of adjudicating an ill-defined problem from a system development and project management perspective and the associated successful transfer of knowledge associated with project requirements. The research explores key project management, systems analysis and design, agile software development and knowledge management methodologies in this context to enhance the successful movement of information. In addition, the chapter discusses the research problem statement and then continues with the research question, proposition, scope and objectives. The chapter concludes with the research aims, design, research methods, theoretical framework, limits of the research, and closing with the thesis structure.

1.1 The Doctorate of Project Management Program

The Doctor of Project Management (DPM) is a research based doctoral program undertaken at the Royal Melbourne Institute of Technology (RMIT) School of Property, Construction and Project Management located in Melbourne, Australia. The program includes four compulsory courses that contribute to shaping potential research topics:

- Project Management Theory and Practice Knowledge Management and Innovation
- Project Management Leadership (centred around business strategy as a program/project driver, stakeholder engagement, organizational forms, impact of national/organizational culture, and leading versus managing)
- Project Management Procurement and Ethics (creating value through ethical and sustainable project delivery, value chains, project delivery forms, and benefits management)
- One elective course

The DPM is a combination of 33% coursework and 67% research that is conducted in the workplace of the DPM candidate. After successfully completing the course work, that includes research and the publishing of a number of articles in academic journals and other project management forums, the candidate then focuses on the thesis problem statement. The research exercise in this thesis was observed, evaluated and completed in the actual work environment of the author. The DPM requires deep interaction with current project management practices, tools, techniques and methodologies, and it is expected to contribute to the project management body of knowledge through superior understanding of project management practices. See Appendix A for a course breakdown and links to this thesis.

The structure of the DPM, as depicted in Figure 1.1, illustrates the course work as well as the reflective learning that occur from each course. These reflective learning courses give the candidate the occasion to reflect on the course work as well as his or her experience in the environment and assimilate the two together. Having spent over twenty five years in the project management field working on a number of very diverse projects, the reflective learning gave the author the time to pull together relevant rich tacit knowledge from my organization and industry. It also facilitated an increased understanding of the underlying value systems and norms in North America and then tied that back to each learning module. Each module builds and gives input into the overall research thesis.
A crucial and strategic piece of the reflective learning is that the research problem statement increasingly comes into view. As seen in Figure 1.2, the objective is to articulate issues that have been frustrating or aggravating to the candidate and to reflect on gaps in the processes or models that do not work for the candidate or the environment in which the candidate works. The next step is to take the time to reflect on the question(s) that would have to be answered to disentangle and resolve the enigma. Finally, the thesis proposes a successful solution that is based on existing knowledge and builds out in a real world environment.
The interest that the author has pursued utilizing the DPM is the impact of project requirements on project outcomes, specifically ways to successfully transfer the knowledge of requirements through the project processes. After twenty-five years working in the project management field and managing an assortment of small and large projects, the author observed a continually reoccurring theme. Poor requirements and requirements management seems to have negative impacts downstream on the projects. This impression is also supported through empirical evidence presented in Section 2.2.1. The DPM drove the author to reflect on long standing theories and schools of thought and challenge them with empirical data and research by my use of a case study approach to investigate complex relationships. The DPM process as seen in Figure 1.2 provided the framework for my thesis as well as the related journals I have authored.
Figure 1.3 above demonstrates the linkages between the course work and the research papers that ground the theme of the thesis. The skills learned, such as writing an academic dissertation and refining my research skills in the real-world, come together to see this thesis to fruition.

1.2 Personal Background

It is relevant to introduce my personal background within the Project Management (PM) domain as this thesis involves my intimate interaction with the research process and my PM expertise is relevant and critical to the credibility of the research process. I have over 25 years of project management and change management experience within Canada and the United States. I am a Six-Sigma trained professional project manager, specializing in process improvement, with an extensive management background that includes managing large process improvement and change management projects to successful completion. I have managed complex projects and have completed within
Time, Cost and Critical to Quality (CTQ) requirements to reduce Touch-Time\(^1\) and Cycle-Time\(^2\) within a multifaceted provisioning process with over fifty team members reporting directly to the project manager. In addition to being experienced in traditional project management, I have an extensive background and experience in agile software development, having led software projects utilizing the Scrum methodology or Extreme Project Management (XPM)\(^3\).

I hold a Bachelor’s degree in Sociology from the University of Western Ontario located in London, Ontario, Canada, as well as a Master’s of Science degree in Project Management from the University of Wisconsin (Platteville). Additionally I am an active Project Management Institute (PMI®) member and certified Project Management Professional (PMP®) and have contributed to the fourth edition Project Management Body of Knowledge (PMBOK®) as a project team member. I have managed waterfall projects from an agile development perspective; I am also certified by the ScrumAlliance® as a Scrum Master.

In addition, I am founder and president of **David G. McKenna Consulting**. The primary service of this business is teaching at the university level as an adjunct professor and professional training in project and program management to private firms. Therefore activities such as instructing as an adjunct professor teaching undergraduate courses in project management at Ryerson University in Toronto, Ontario, Canada, and a graduate level course in program management through the University of Wisconsin-Platteville are relevant to this research project. I have also developed and implemented a number of Project Management training courses for a number of large and small organizations within Canada and the US.

---

1 In a Lean Production system the touch time is the time that the product is actually being worked on, and value is being added. This is typically only a small proportion of the total production time, most of the time is taken up by moving, queuing etc.

2 Cycle Time is the time from the beginning to the end of the process. It includes move, queue and process time throughout the development cycle.

3 These are specific terms used in Agile Software development for more details on these see Poppendieck, M., and Poppendieck T. (2003). "Lean software development - an agile toolkit." Addison Wesley, New York, NY.
1.3 Research Background

Project management, agile or lean software development and systems analysis and design have been identified as absolutely necessary tools and techniques for the success of all types of projects. A number of articles and research papers discussed and cited in Chapter 2 of this thesis have identified areas of difficulty with respect to meeting the limits of a project’s metrics, quality, time, cost, functionality and overall benefits. One of the substantial sources of difficulty is the enigma of the creation and implementation of various project requirements; specifically the successful transfer of the requirements’ attributes throughout the project process from conceptualization to control.

With a substantial focus on the knowledge transfer of the attributes of project requirements, the success of the project’s scope, quality, time, cost, metrics and benefits increases. As outlined by Robinson, Pawlowski and Volkov (2003), the objective of project requirements is to improve systems modeling so that critical systems aspects (requirements) are understood before they are actually built. If requirements are not unambiguously understood by not only the creator, but by those people downstream in the process, the requirements will not meet the project stakeholders and customer needs. If the requirement(s) does not meet the stakeholders’ needs, then time and costs increase significantly, because of re-working of the requirement(s).

Another aspect of the knowledge transfer of the characteristic of project requirements is the holistic or system approach required, such as soft system methodologies for the creation and transfer of requirements to improve project success. As put forward by Alshawi and Al-Karaghouli (2003), a system approach gives adequate attention to both the human and organizational issues that often determine the project’s ultimate success given that getting the requirements conceived correctly during the initial stages of the project life cycle increases the success of projects. Having a system approach also assists in unraveling complex or ill-defined problems and requirements that the project team may need to resolve before requirements can be articulated, documented and then successfully transferred to others.
1.4 Organization Under Study

The research for this thesis was conducted in a large regional telecommunication firm in Canada. The research subjects were part of a small skunk works team, being a group of highly innovative and non-conforming individuals that are placed in an isolated work environment to develop radically new ideas; isolated from the major body of the organization to create new and innovative solutions and processes to advance the delivery of a new product without the pressure to conform to the status quo in the larger organization. A short time after my research was completed, the skunk works team was slowly disbanded over the course of 12 to 16 months, and the output of the team’s efforts was pushed into the day-to-day operations of the main organization. This was a unique opportunity to work and conduct research on a small team of highly motivated individuals that truly aspired to making positive changes. This team constantly broke the state of affairs of long held beliefs within the organization and truly looked for the better way to do activities within their control as well as desperately attempting to leave behind the legacy of many decades of its existing management practices i.e. the ‘we have always done it this way’ attitudes.

1.5 Research Problem Statement

This research study examines the nature of adjudicating an ill-defined problem from a system development and project management perspective. The research investigates the nature of knowledge transfer between various groups, for example from New Product Introduction (NPI) and New Technology Introduction (NTI), Marketing, and Engineering, as well as across various business stakeholders such as Business Analysts (BA) and Project Managers (PM), project team members and customers and end users.

The aim of the research is to confidently facilitate the exchange of knowledge between various business units and individuals in a business setting to positively increase the likelihood of the speed to market for complex projects. Additionally, another topic that is discussed is how project team members reach an agreed-upon conclusion, after discussions or deliberations of an ill-defined problem, process, business or systems
needs. From a system development and project management perspective the project team members are required to determine valid business requirements for a new product project and or system development project. Lean project team members, as coined by the author, are project team members that are involved with lean projects using the lean project management methodologies. Lean project management as described by Mascitelli (2002) is used to eliminate non-value-added activities from projects. The main focus of lean project management is to do activities that only deliver value to the project, customers and end users. Lean project management ensures that all activates in the project will have a tangible output by ensuring that the many meetings and the creation and distribution of documentation within a project, in fact, do deliver value to the project and the end customer and make certain that all the resources needed to support the project are easily accessible. The research is valid for both lean project resources that are Software (S/W) focused using an agile mythology, as well as for the traditional waterfall project management method that can be applied outside of software projects and is generally used for a very diverse variety of projects such as Human Resource (HR), process improvement, construction projects etc. This research study examines and answers the question of adjudicating an ill-defined problem from a system development and project management perspective by the removal of the barriers to knowledge transfer and the enhancement to knowledge transfer.

1.6 Research Questions

The research questions that are addressed by this thesis are as follows.

1. What drives poor business requirements production that negatively impact project outcomes in the implementation phase that result in negative impacts to the overall project?

2. How does the removal of the barriers to knowledge transfer and the enhancement to knowledge transfer ensure that customer requirements meet customer expectations and reduce the negative impact to project time, cost, system functionality and schedule?
1.7 Research Proposition

The research proposition can be stated as:

P1 - The discipline of project management will be advanced with the exploitation of the proposed knowledge management overlay model.

The knowledge management overlay model proposed in this thesis will assist the project team members, as well as any other stakeholders, teams, and departments that are involved with the project in transferring customer and end user requirements from person-to-person and group-to-group without any significant distortion and/or loss of requirements intent. Improving the transfer of requirement content should then have a positive impact on the overall success of a project and the positive acceptance from the customer or end user. There are four premises originating from the proposition as illustrated in Table 1.1 below:

Table 1.1 - Research Propositions Premises

<table>
<thead>
<tr>
<th>Successful knowledge transfer between individual to individual</th>
<th>Successful knowledge transfer between group to group</th>
<th>Successful knowledge transfer between department to department</th>
<th>Successful knowledge transfer between project team and customer/end user</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual – being a single person that is sending or receiving project knowledge to and from another individual. For example in an interview scenario.</td>
<td>Group – being a group of people exchanging knowledge from one person to a group or a group to one person or group to group. For example a focus group.</td>
<td>Department – being departments within an organization that are exchanging knowledge from and to another department. For example the marketing department exchanging knowledge with the engineering department.</td>
<td>Project team and customer/end user exchanging knowledge. For example a business analyst interviewing with an end user that is the recipient of the project outcome.</td>
</tr>
</tbody>
</table>

1.8 Research Scope and Objectives
The intended scope of the thesis includes identification of areas of knowledge disruption and inadequate knowledge transfer that impede the transfer of knowledge that directly impacts business and system requirements from a business analysis and project management perspective. Its practical objective is to create a knowledge management overlay model that offsets current identified requirements management deficiencies. This will therefore necessitate identifying areas of knowledge transfer that are augmented to enhance the successful progress of knowledge transfer.

The proposed knowledge management overlay model will include associated processes that can facilitate project teams, from a knowledge management perspective, to be able to deliver an innovation project-to-market more responsively as well as fully meeting the customer requirements.

1.9 Research Aims

The research aim of this thesis is to apply an orderly, logical, and consistent knowledge transfer methodology to ensure the consistent transfer of knowledge from one entity to another.

The specific expected outcomes from this research are:

1. Provision of a conceptual model and theory for knowledge transfer that can be overlaid into the project management and systems analysis environment.
2. Improvement of project success as defined by scope, quality, time, cost, metrics and benefits through
3. A consistent knowledge flow from one entity to another in clearly and accurately managing project requirements.

This research will investigate the increased effectiveness of knowledge transfer on achieving improvements in delivering new products and services, and the processes
needed to improve speed-to-market of these products and services. The main concepts are the removal of destructive distractions that are barriers to knowledge transfer for project managers, project team members, stakeholders, and business analysts as well as systems development resources and to augment knowledge transfer using best practices when transferring knowledge.

1.10 Research Design

This research is designed to address the research questions listed in the research aims. The first phase is the in-depth literature review on project management processes and systems analysis design, as well as adult learning methods. The second phase is a case study on a relevant project team, and the final phase is the development of the knowledge management overly model.

The main outcome of the research is the understanding of both the barriers to knowledge transfer and enablers of knowledge transfer as well as the refinement of the knowledge management model for the practical real world environment. However additional research needs to be conducted specifically into larger and more complex environments, such as larger and more complex projects and project solutions. Additionally the research was limited to North America organizations. Supplementary research should be conducted in various cultures in other regions of the world.

This research is focused on the knowledge management model for the augmentation of knowledge transfer in a business and project focused environment. However, I suggest that the knowledge management model can also be applied to other organizational areas such as Human Resources, Finance, and Businesses Development. The process surrounding the knowledge management model can be supported equally well within these domains. However further research would be needed to validate if the model is well suited to the other domains mentioned above. Table 1-2 summarizes the drivers of this research.
Table 1.2 - Research design

<table>
<thead>
<tr>
<th><strong>Theory:</strong></th>
<th>The case study will show why the successful creation of business requirements positively impacts project implementation (scope, cost, time metrics and quality).</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Study Question:</strong></td>
<td>What drives poor business requirements production that negatively impacts projects in the implementation phase (ineffective lacking transfer of knowledge, poor definition of requirements)?</td>
</tr>
<tr>
<td><strong>Study Proposition:</strong></td>
<td>The creation of a knowledge management model (augment the knowledge transfer of requirements distribution through the project team and stakeholders).</td>
</tr>
<tr>
<td><strong>Unit of Study:</strong></td>
<td>Implementation process, relationships and successful requirements (no additional requirements added to the project or changes or modifications).</td>
</tr>
</tbody>
</table>

The research design follows three phases as illustrated in Figure 1.4 below.
Figure 1.4 - Research design

Phase 1: This is addressed through the in-depth literature review of current project management methodologies and schools of thought. This includes, but is not limited to, agile project management and waterfall methodologies of software and new product development. The literature review also reviews current thinking on the system development and design methodologies. Throughout the thesis, there are a number of adult learning theories that are incorporated within the theme of the thesis as they
provide the basis of how adults learn, transfer and retain knowledge with respect to project management and systems development methodologies.

Phase 2: This is an exploratory case study used to comprehend how knowledge is transferred during a process re-engineering project. The author uses a single case study and justifies this approach as being appropriate to the case as it is an extreme example of change being instigated through a separate skunk works organization segregated from a large bureaucratic ‘legacy’ organization.

Phase 3: This is the development of the knowledge management overlay model. After reflecting on the current literature and the latest schools of thought on the topics of project management, requirements gathering and knowledge transfer, as well as personal reflection, the output conclusion is the development of a working knowledge management overlay model.

1.11 Research Methods

A central research technique applied in this thesis is the Action Research (AR) technique. Action research is defined by Stringer (2007) as a collaborative approach to understand and resolve a problem where the researcher uses systematic actions to reach a conclusion of the issues under study. It is an iterative process of continually cycling through the steps of diagnosing, planning action, taking action, evaluating and repeating the process, diagnosing, planning action, taking action, then evaluating. This is done repeatedly until the researcher can confidently and soundly contribute new knowledge and or a new theory to a chosen topic of research. The research must produce a relevant answer(s) to the select hypothesis. Zuber-Skerritt (2002) has set out a generic model with the eight main components of the Action Learning and Action Research model as demonstrated in Figure 1.5. Starting with the problem definition, the AR process then moves into the start-up workshop or the Kick-Off Session (K/O) used to orientate the research team. This K/O session is facilitated by the researcher. The project work is the ‘action’ component and represents the bulk of the activities.
The project work is interrupted with a midway workshop to share concerns, lessons learned, risks and reflection on the activities to date. The cycle ends with a concluding workshop presentation and publication(s). Zuber-Skerritt (2002) also introduces a number of core values with respect to AR. These core values surround the complex mental states involving beliefs, feelings and values of the participants of the complex mental states about the AR process. They include synergy, collaboration, openness, trust, as well as systems thinking, and the ability to focus on learning and questioning. This lays out the fundamental groundings of AR.

![Action learning and action research model](image)

Figure 1.5 - Action learning and action research model (Stringer 2007)

Action research has been one of research technique of choice for information systems researchers. McKay and Marshall (2001) reason that AR is an influential research tool for understanding the fundamental interaction between resources, technology, information and socio-cultural contexts. The fundamental goal of AR is to improve through changes to a situation such as resolving an ill-defined problem from a system analysis/project management perspective and, therefore, creating ‘new’ knowledge.
McKay and Marshall go on to note that AR can be broken into two discrete functions to augment to the research process as see in Figure 1.6, where Mps represents cognitive mapping and Mr is the AR component.

Figure 1.6 - Cognitive mapping in action research (McKay and Marshall, p.52)

Cognitive mapping is an analysis method using interviewing techniques to let the interviewee think through issues of strategy (Tyler, 2001). The issues are then graphically displayed after a number of iterations that have identified the mental models of the interviewee. This results in a graphic representation of the individual’s view of the world and how he or she makes decisions regarding the topic under investigation (Ahmad and Ali, 2003). This fits well with an Information System Information Technology (ISIT) research project such as the author’s current inquiry. This methodology breaks AR into two cycles; the first is focused on solving the ‘problem’ being poorly defined requirements and the other component focuses on research interest. Together they add rigor to the research process and specifically for S/W and ISIT projects.

As an active participant in this project, and therefore taking part in the AR in a participative AR sense, I was close enough to the day-to-day interactions and activities to have an intimate knowledge of the context, workplace culture and milieu of the situation under study. This enabled me to better identify salient issues and, while I had
to consciously guard against personal bias from my participation, I was better placed to understand the intricate sub-text of the situation under study.

Yin (1994) maintains that single case studies are of value when investigating a particular setting that is unique or is representative of an extreme phenomenon under scrutiny. The group that is focused upon in this case study represents an example of knowledge transfer within an extremely turbulent and volatile work environment, with a focus on making ground-breaking advances in re-engineering processes to develop new Information Communication Technology (ICT) products and services. The group was part of the organization’s skunk works unit that was established to change the organization’s culture, and this group was expected to adopt new and extreme methods and approaches to radically change the way that a Voice over Internet Protocol product and service could be provisioned and distributed in practice. The current focus is on speed of delivery of goods and services to market for highly innovative classes of product such as Voice over Internet Protocol (VoIP) and makes this type of case extreme in nature. While there have been a lot of studies on knowledge transfer in normal project management situations, there have been few conducted with a focus on knowledge transfer in a skunk works.

The study is exploratory in nature as its aim is to investigate whether it would be of value to undertake a detailed study of the effectiveness of knowledge transfer on achieving improvements in delivering new products and services and the processes needed to improve speed-to-market. Thus a case study approach is used with data being gathered from a small number of representative people who were able and willing to participate, but more importantly, were intensely immersed in the project and could therefore provide rich insights and data relating to the knowledge transfer effectiveness. Further study that could subsequently take place would revolve around gaining additional insights using Soft Systems Methodology (SSM) (Checkland, 1999), to more fully understand the disjointed situation facing knowledge transfer in this context, and to prioritize improvement actions and use action participative learning (Coghlan 2001; Zuber-Skerritt 2002; Coghlan and Brannick 2005) to study improvement initiatives and
then use grounded theory (Strauss and Corbin 1998) to better understand how the actions that will be scrutinized led to observed and measured outcomes from those initiatives.

The exploratory study reported upon in this thesis involved gaining data through direct observation by the author who was an active participant in the case study work so this is represented using a participative action learning approach of observation, note taking and analysis, reflection, feedback and iterating through several trial and error cycles of trying to perfect the actions, being knowledge transfer, under investigation. The use of participative action learning is a well-established research methodology (Coghlan 2001; Coghlan and Brannick, 2005). Data were also gathered using a focus group of representative trainers from the organization who were charged with facilitating training, knowledge exchange and knowledge transfer in diffusing the innovation processes throughout the parent organization.

The research was conducted in a large North American organization. The research is limited by this geographic restriction. However the nature of project management and systems design, such as the development life cycle methodologies, are not limited to North America. The knowledge transfer overlay model is considered a consistent methodology that will be effective worldwide with only minor modifications to local conditions.

1.12 Structure of the Thesis

Figure 1.7 illustrates the thesis structure, the arrangement and interactions between the chapters to be discussed. The thesis comprises eight major chapters.
Figure 1.7 - Structure of dissertation

Chapter one establishes the position of this research project and the overall scope of the thesis through the research background, the rationale of the research, the research problems statement, research questions, research proposition, research scope, objectives and aims, research methods, theoretical framework, and the limitations of this research.

Chapter one also provides an introduction to the thesis opening with a description of the DPM program given by the RMIT University located in Melbourne, Australia and the course structure. The chapter gives a brief overview of the author’s personal and professional background. The chapter highlights the problem statement, research
question, scope and objectives. The chapter goes on to define the aim, design research method and theoretical framework of the thesis. The chapter ends with the limitation of the research and a brief summary of the thesis overview.

Chapter two provides an extensive literature review on the existing body of knowledge on lean or agile practices, system development and project management and the traditional waterfall life cycle. The review addresses the history and benefits of lean or agile practices, system development and project management. The review discusses the tools and techniques and processes in existence today and practiced by professional project managers and system development resources practitioners. This review gives a strong foundation of both project management and the systems development and design methodologies and sets the stage for the knowledge management overlay model that is developed in this thesis. The chapter also covers project requirements and a discussion on knowledge management, knowledge transfer and knowledge management in the project domain.

Chapter three presents the research method and design for the thesis. The chapter opens with an explanation of the ontology and epistemological viewpoints. The chapter continues with a definition of the research purpose, testing method, research questions and objectives. There is an explanation on the design and structure including the phases of the research. The chapter ends with an examination on the data collection, validation and ethical concerns.

Chapter four represents the development of factors that influence knowledge transfer. The chapter provides a foundation for current thinking and research associated with knowledge management and knowledge transfer from various perspectives and industries and organizations. The chapter analyzes the impact that senior management has on resources’ motivation through a survey to project team members. The chapter also considers the results of an exploratory focus group regarding problems and opportunities for project success with a number of project team members. The chapter
closes with observations from the author and linking them back to theoretical frameworks.

Chapter five is the exploration of factors influencing knowledge transfer. This chapter focuses on a refined focus group session that evaluates the barriers and enablers to knowledge transfer. The knowledge transfer overlay model is based on these specific data. The chapter describes the environment in which the focus group was conducted and the research approach and rationale. The chapter ends with an in-depth analysis of the data and drives the results into the solution stated in chapter six.

Chapter six examines the knowledge transfer model and its application within the project management domain. The chapter argues the impacts of destructive distraction as a barrier for successful knowledge transfer. Distractions discussed include the illusion of increased productivity that are due to multitasking and the impact of acronym and internet and intranet web designs. The chapter also investigates the knowledge exchange environment and how the place of knowledge exchange has a positive or negative impact.

Chapter seven describes the results of the research conducted and a discussion on the knowledge transfer model in a practical, real world setting. The chapter discusses in detail the recommendations derived from the research argued throughout the thesis. The chapter directly addresses and answers the problem statement being resolving an ill-defined problem from a system development and project management perspective.

Chapter eight gives a concise summary of the results of the thesis as well as a number of limitations, constraints and further research opportunities. The chapter also examines the results of an expert panel that reviewed the data and results of this thesis and its practicality and acceptance in a project management environment.
1.13 Summary of Chapter

This opening chapter has provided an introduction to the thesis. The main argument of the research is adjudicating an ill-defined problem from a system development and project management perspective, specifically with the introduction of the knowledge management overly model. The chapter gives a brief explanation of the Doctorate of Project Management from the Royal Melbourne Institute or Technology University and its processes for the program. Following is a short description of the author’s personal background and experiences in the domain of project management. The research questions, proposition and scope and objectives are discussed. The chapter also explains the research aims, design, methods and theoretical framework as well as a brief description of the knowledge management model that is developed in the thesis. The chapter ends with a discussion on the limitation of the thesis and the overall structure.

The issues in this chapter are further examined in Chapter 2 by means of an in-depth literature review on the underlying domains which will lay the foundation of the theories and concepts drawn upon for this thesis.
Chapter 2 - Literature Review

2.0 Introduction

The purpose of this chapter is to review pre-existing research on project success and the relationship with knowledge transfer through the entire project management life cycle. Do the barriers and enablers of knowledge transfer influence project outcomes? The chapter examines existing project management life cycles and methodologies. What can influence knowledge transfer? The chapter also examines in detail motivators to project team members such as the types of knowledge, tacit knowledge and innovation, motivation, trust commitment and innovation. Why is knowledge difficult to move between project team members? The literature review explores the reasons why knowledge exchange is considered sticky and difficult to traverse from source to recipient. The skills and knowledge necessary to manage knowledge transfer and the willingness to transfer knowledge within a project management environment are addressed through a number of surveys in Chapter 4 and focus groups in Chapter 5.

The unit of inquiry for this research is the project management environment, with the project members being central to successful exchange of knowledge that has a positive impact on project success. Section 2.2.1 establishes project success factors within North America. Sections 2.2.2 through 2.5 examine the many project life cycles that are in existence in the twenty-first century to which the knowledge management knowledge transfer model is applied. Sections 2.7 through 2.7.2 examine knowledge management and the various types of knowledge. Section 2.7.3 examines motivation, trust and commitment that are used in Chapter 4 to establish the impacts and linkages of this behaviour on the knowledge transfer model. Section 2.7.5 takes an in-depth view into knowledge stickiness that is applied in Chapter 6 and 7 as the foundation for the knowledge transfer model. The chapter ends with a review of enablers of knowledge transfer.
The literature review establishes a foundation for the knowledge management model and linkages to established theories and methods that the knowledge management model is overlaid upon and summarized in Chapter 8.

2.1 Established Literature

This research thesis examines the nature of adjudicating an ill-defined problem and suggests a solution for the successful transfer of knowledge within a system development and project management perspective and introduces a knowledge management overly model. Prior to a project requirement(s) being communicated among various team members and various groups within and or outside of the project environment, which is the focus of this thesis, the business problem must first be understandably and intelligibly understood and resolved. Szulanski (1996) argues that information, data, and knowledge are “sticky” and difficult to transfer from one person to another. Von Hippel (1990) also argues that information used specifically for technical problem solving is also considered sticky. Knowledge stickiness and its impacts are discussed in detail in Section 2.7.3. Adjudicating is the ability to resolve or to settle on a conclusion, as an example to agree and settle on a business problem or project requirement through problem solving. This is done by choosing issues that need consideration, setting goals, evaluating situations and making sound choices and choosing the correct actions to take to resolve them (Simon, Dantzig, Hogarth, Plott, Raiffa, Schelling, Shepsle, Thaler, Tversky, and Winter 1987). Webster (1988) defines adjudicating as the ability to determine an issue. The Oxford English dictionary (2005) defines adjudicating as making a formal judgement on a disputed matter. Simon et al. (1987) highlight that contemporary problem solving theory has been studied in both the laboratory and field studies and has included, but is not limited to, such areas as physicians’ diagnosis, analyzing game positions and business decisions. Within the project management domain, there can be many Subject Matter Experts (SME) that interact with the other project team members and stakeholders. Problem solving for SMEs involves large amounts of information and data that can be stored in the SME’s
head and are difficult to express and require relevant cues for the solver to recognize. There are a number of generally accepted techniques to assist with resolving a business problem or project requirements as noted in Table 2.1 (International Institute of Business Analysis, 2009).

Table 2.1 - BABOK version 2.0 (International Institute of Business Analysis, 2009, p.53)

<table>
<thead>
<tr>
<th>Elicitation Technique</th>
<th>Synonym</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brainstorming</td>
<td>Group problem-solving technique</td>
</tr>
<tr>
<td>Document Analysis</td>
<td>Review existing documentation</td>
</tr>
<tr>
<td>Focus Groups</td>
<td>Interview in open session</td>
</tr>
<tr>
<td>Interface Analysis</td>
<td>External interface analysis</td>
</tr>
<tr>
<td>Interviews</td>
<td>Questioning of an individual person</td>
</tr>
<tr>
<td>Observations</td>
<td>Job shadowing</td>
</tr>
<tr>
<td>Prototyping</td>
<td>Story board, navigation flow, paper prototyping, screen flows</td>
</tr>
<tr>
<td>Requirements workshops</td>
<td>Elicitation workshop or facilitated workshop</td>
</tr>
<tr>
<td>Survey/Questionnaire</td>
<td>Set of questions presented to people to gain statistical information and to obtain the opinions of a wider audience</td>
</tr>
</tbody>
</table>

This thesis and subsequent research also investigate the nature and influence of successful or unsuccessful knowledge transfer between various groups within a project/system development environment. For example, the problems of knowledge transfer between various groups, such as the information stream between concept of a new solution or, product, cost reduction project from New Product Introduction (NPI) departments and or New Technology Introduction (NTI) across various business boundaries such as marketing, engineering, Business Analysts (BA), programmers, stakeholders, customers and program and Project Managers. As put forward by
Alshawi and Al-Karaghouli, (2003) the customers have their business knowledge, and they understand their own needs. It is important that the end user or customer’s needs or requirements are truly met and not diluted through the project management process that would make the product or solution less valuable to the customer or end user. Leonard and Rayport (1997) show how empathic design developed through co-learning and product development can take place in an organization when product/service developers and customers are brought together so that the developers can unearth tacit and hidden value through what they term ‘empathic design’. System developers, project managers and their teams also have the required technical knowledge and are influenced by their knowledge domain. Alshawi and Al-Karaghouli (2003) argue inherently the two perspectives are and will be different and lead to a mismatch of knowledge and understanding, which may result in potentially failed projects or a project that does not meet the original project criteria of time, cost, quality and functionality.

The aim of the research is to facilitate the exchange of knowledge between these various business units to positively facilitate the speed to market for complex projects by implementing a knowledge management overlay model onto existing project management and system development processes. The topic that needs to be resolved is how do project team members and or lean project team members reach an agreed-upon conclusion after discussions or deliberations of an ill-defined problem or process from a system development/project management perspective and determine the sound business requirements for a new product and or system development project? It is the business requirements that are identified at the beginning of the project, that if distorted over the duration of the project, have the most influence to impact on the time, cost, quality and functionality criteria.

Söderlund (2004) argues that project management is a means of managing organizational activities. Söderlund contends that research regarding the management and organization of projects requires five fundamental questions to be answered being:
1. Why do project organizations exist?
2. Why do project organizations differ?
3. How do project organizations behave?
4. What is the function of, or value added, by the project management unit?
5. What determines the success or failure of project organization?

This thesis explores and attempts to answer question five being, what determines the success or failure of project organization? The thesis answers this question in a limited capacity, based on the success or failure of knowledge transfer that directly impacts project outcomes by means of project requirements. Past research has been done and continues to clarify goals, top management commitment, and communication that can also be positively correlated to project success. Söderlund (2004) concludes that there is the need to develop theories and hypotheses of projects in a comparable manner as the broader field of management and the classical scientific standpoints.

Artto and Kujala (2008) identify four major areas in what they call project business research. Project management or project business can be defined as “Project business is the part of business that relates directly or indirectly to projects, with a purpose to achieve objectives of a firm or several firms” (Artto and Wikström, 2005, p. 31). The four areas stated are management of a project, management of project-based firms, management of the project network and management of the business network. First, Artto and Kujala (2008) focus on managing a single project. Second, consideration is given to the management of a project-based firm by observing the organization’s overall management ability and the capability of the management to execute projects. Third is the management of a project network, with the network representing a numbers of different organizations participating in a single project. Finally, the management of business network, being several firms only intermittently contributing to a common project(s). Table 2.2 describes the project business research fields, research areas and themes that Artto and Kujala (2008) believe are relevant and applicable for research. This thesis is focused on both the management of a project and the management of a project-based firm by increasing the success of both single projects and supporting the
strategy and business objects of the organization by utilizing the knowledge transfer model to the overall firm and meeting both the short-term and long-term goals of the organization.

Table 2.2 - Characteristic of project business framework (Artto and Kujala, 2008, p.474)

<table>
<thead>
<tr>
<th>Unit of analysis</th>
<th>Management of a project</th>
<th>Management of project-based firms</th>
<th>Management of project network</th>
<th>Management of business network</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management of a single project</td>
<td>Management of a firm and its multiple projects</td>
<td>Managing multiple firms participating in a project</td>
<td>Management of a network and their relationships</td>
<td></td>
</tr>
<tr>
<td>Management object</td>
<td>A project</td>
<td>A firm</td>
<td>A project as a multi-firm network</td>
<td>A network of firms and their relationships</td>
</tr>
<tr>
<td>Managerial challenge</td>
<td>How to deliver a project?</td>
<td>How to ensure that projects support the strategy and business objectives?</td>
<td>How to manage the project enterprise?</td>
<td>How to position the firm in the value network?</td>
</tr>
<tr>
<td>Measure of success</td>
<td>Meeting project goals</td>
<td>Meeting short-term and long-term goals</td>
<td>Creating contractual arrangements, goal alignment and coordination across multiple firms</td>
<td>Competitiveness and capability of individual and networks to create and implement the project</td>
</tr>
<tr>
<td>Main actors and decision makers</td>
<td>Project manager</td>
<td>Business unit manager</td>
<td>Owner</td>
<td>Focal firms in business network</td>
</tr>
<tr>
<td>Existing body of knowledge</td>
<td>Project and program management</td>
<td>Portfolio management and project-based operations</td>
<td>Procurement and supply chain management</td>
<td>Partnerships, alliances and joint ventures</td>
</tr>
<tr>
<td>Significant contingency factors</td>
<td>Project uniqueness</td>
<td>Interdependence between projects</td>
<td>Asymmetry of participating firms objectives</td>
<td>Norms and culture and relationships between firms</td>
</tr>
</tbody>
</table>

49
This thesis topic also conforms to and fits into the project management discipline in the following ways. The research is completed within a project situation, being conducted with practitioners within a large North American organization. Although research within the project management discipline is limited, it is becoming more significant in the last number of decades. Artto and Wikström (2005) maintain that project business is an evolving area of research from both the scientific and managerial perspective, and projects are a significant force with respect to strategic and tactical activities of an organization. Project management, as a discipline, can be segregated away from other business activities such as research and development, operations, financial and marketing activities and can therefore be researched as a single distinct entity. This thesis research is based on the project business or project management discipline and provides lessons that can be rolled out within the studied organizations, project by project, and can also potentially be seen as used across a network of people in a similar community of practice.

2.2 Project Management Success, Failure and Life Cycle Resourcing Considerations – A Lean Project Design Perspective

The project management discipline has experienced tremendous rigor surrounding the system development and project management processes, and they are well documented, such as the IEEE 830 1993 (IEEE, 1993) standard for a recommended practice for software requirements specifications to prepare the foundation for successful IT projects.

2.2.1 Project Success Factors and Processes

Regardless of existing project management and system development processes North America has been unsuccessful in many software projects for a number of reasons as
stated in the famous “CHAOS” study conducted by the Standish Group in 1995 and subsequently repeated over following years as recently as 2009\(^4\). The CHAOS study showed that project implementation in the U.S. was in chaos as suggested the title of the research. Only nine percent were considered successful on large projects, 16% for medium-sized projects and 28% for small. Cost overruns were 178%, 182% and 214% respectively (Standish Group, 1995). This is a dismal record at best nevertheless is improving as per updated Standish reports. Marchewka (2006) continues with a further breakdown noting that user “involvement leads” is listed as the most important factor in project success, specifically clear communication (impaired knowledge transfer) for example, between the technical resources and non-technical resources for a “clearer” definition of the project’s goals and requirements. Table 2.1 displays a partial breakdown from the 1995 CHAOS study.

**Table 2.3 - CHAOS study 1995**

<table>
<thead>
<tr>
<th>Company Size</th>
<th>Average Cost of Development</th>
<th>Average Cost Overruns</th>
<th>Average Schedule Overrun</th>
<th>Original Features and Functions Included</th>
<th>Successful Projects</th>
<th>Challenged Projects</th>
<th>Impaired Projects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large</td>
<td>$2,322,000</td>
<td>178.0%</td>
<td>230.0%</td>
<td>42.0%</td>
<td>9.0%</td>
<td>61.5%</td>
<td>29.5%</td>
</tr>
<tr>
<td>Medium</td>
<td>$1,331,000</td>
<td>182.0%</td>
<td>202.0%</td>
<td>65.0%</td>
<td>16.2%</td>
<td>46.7%</td>
<td>37.1%</td>
</tr>
<tr>
<td>Small</td>
<td>$434,000</td>
<td>214.0%</td>
<td>239.0%</td>
<td>74.0%</td>
<td>28.0%</td>
<td>50.4%</td>
<td>21.6%</td>
</tr>
</tbody>
</table>

Table 2.2 identifies the Standish CHAOS study top ten factors for project success, which is based on a more up-to-date study than the 1995 classical report that is often cited in the literature on project success. Using all or some of the following recommendations, the probability of a specified outcome, that being, the success of a project is increased. Of interest and the focus of this thesis is the complication of user involvement and number seven being the firm basic requirements.

### Table 2.4 - Standish group (2001) success factors

<table>
<thead>
<tr>
<th>Rank</th>
<th>Success Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Executive Support</td>
</tr>
<tr>
<td>2</td>
<td>User Involvement</td>
</tr>
<tr>
<td>3</td>
<td>Experienced Project Manager</td>
</tr>
<tr>
<td>4</td>
<td>Clear Business Objectives</td>
</tr>
<tr>
<td>5</td>
<td>Minimized Scope</td>
</tr>
<tr>
<td>6</td>
<td>Standard S/W Infrastructure</td>
</tr>
<tr>
<td>7</td>
<td>Firm Basic Requirements</td>
</tr>
<tr>
<td>8</td>
<td>Formal Methodology</td>
</tr>
<tr>
<td>9</td>
<td>Reliable Estimates</td>
</tr>
<tr>
<td>10</td>
<td>Other</td>
</tr>
</tbody>
</table>

Turner (2004) argues that project success revolves around specific criteria, first being the stakeholder agreement to the success criteria of the project to ensure there is a common understanding of what is being delivered and the requirements of the project. Second, is a collaborative working relationship between the project manager and the project owner or product owner. The product or project owner empowers the project manager to manage the project and make decisions regarding the project, and finally the owner has a vested interest in the performance of the project.

The European Software Process Improvement Training Initiative (ESPITI) did a similar study on project success in 1999, which surveyed 3,800 individuals in the software industry (European Software Process Improvement Training Initiative, 1995). The results found that the two largest problems were requirements related. First the requirements description was incomplete or unsuccessfully articulated. The second was the management of customer requirements during the entire life cycle by the project team members. The third highest response for the lack of project success was indirectly requirements related, being poor documentation in general with respect to requirements, testing, coding, and generally to project management documentation.
Jones (1994) investigated the impact requirements errors have on defects downstream in the life cycle, specifically on defects in a development project. Jones found that if there were defects in the requirements, the delivered defect was 0.23 as seen in Table 2.3.

Table 2.5 - Defect summary (Jones, 1994)

<table>
<thead>
<tr>
<th>Defect Origins</th>
<th>Defect Potentials</th>
<th>Removal Efficiency</th>
<th>Delivered Defects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Requirements</td>
<td>1.00</td>
<td>77%</td>
<td>0.23</td>
</tr>
<tr>
<td>Design</td>
<td>1.25</td>
<td>85%</td>
<td>0.19</td>
</tr>
<tr>
<td>Coding</td>
<td>1.75</td>
<td>95%</td>
<td>0.09</td>
</tr>
<tr>
<td>Documentation</td>
<td>0.60</td>
<td>80%</td>
<td>0.12</td>
</tr>
</tbody>
</table>

Whittaker (1999) undertook a survey of 1,450 public and private sector organizations to study the causes of project failure. The results showed that poor project planning, a weak business case and a lack of management involvement and support were the top three indicators. Within project planning, one of the key sub indicators is weak definition of requirements.

These factors appear to relate to the use of successful processes and other factors that lead to project success, particularly in IT projects. It is useful to compare the Whittaker data with other studies to ensure that the general best practices in these types of projects are validated and a reasonable assessment of what facilitates success. The following Table 2.6 summarizes several studies that specifically relate to IT projects and new product development.
Table 2.6 - Summary of the relevant studies into project success and processes

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Requirements</td>
<td></td>
<td></td>
<td>1</td>
<td>1, 2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Design and coding</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Documentation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Executive support</td>
<td>1</td>
<td></td>
<td>2, 3</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>User involvement</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>3</td>
<td>1, 2, 3</td>
<td></td>
<td></td>
<td></td>
<td>2</td>
</tr>
</tbody>
</table>

All of the success factors have requirements management and requirements, whether stated as a factor or as a sub factor, of a higher success component making requirements a significant influencer of overall project success. In addition at any time in the life cycle, project information or project requirements are passed from one person to another or from one group to another, and there is a need for the successful transfer of that information.

The purpose of this thesis is to explore, better assess, and most significantly, develop the understanding and augment the effectiveness of knowledge transfer that occurs related to the systems development and project management processes within a highly dynamic and intensively active work team and between members of that team and key implementers. The success factors noted in Table 2-6 illustrate how the process improvement project studied in this thesis provides an important background set of processes and factors that should be designed into any change management project involving IT products and services in particular.

A key focus is on the requirements of the project’s scope that are exposed at the beginning of a project and enhanced as the project moves through the various phases of the project life cycle. Project requirements as described by Courage and Baxter as the features and attributes of a product or project solution that should perform from the
user’s perspective (Courage and Baxter, 2005). The fourth edition of the PMBOK® Guide describes a requirement as defining and documenting stakeholders’ needs and expectations to meet the project objectives (PMI, 2008). The focal point of this thesis is the successful development and movement of knowledge between the various team members, project groups, internal and external departments and stakeholders to meet the project’s objectives and more importantly to ensure that the customer’s requirements are met.

2.2.2 Project Life Cycle Considerations

The project life cycle is a common method of laying out the process of project and change management. Figure 2.1 illustrates a generic life cycle as described by Marchewka (2006) that includes the major phases of the project timeline, being define, plan, execute, close and evaluate a project. By breaking a complex project into discrete phases the project can be exposed into more manageable components, and the indicators of success or failure can be evaluated during the progression of the project rather than waiting until the end of the project when the ability to recover a distressed project is gone.
Along with this generic project life cycle shown in Figure 2.1 there are a number of other life cycles models that will be discussed such as the waterfall model, Six Sigma framework, unified process life cycle model, adaptive S/W development, agile S/W development, PRINCE2 (PRINCE2, 2010) as well as a number of other hypothetical descriptions of complex process models. These models and methodologies, described below, identify, qualify and quantify the state of the environment in which a situation exists. It is through these methodologies that a scope statement, problem statement, conceptual solution and requirements are developed in the planning phase of a project, it is within these front-end activities that the knowledge management overlay model is to be implemented. Following is a brief description of some of the current philosophies regarding project and software life cycles.
A waterfall approach is the generic term for the identifiable activities within a development process being undertaken as a linear series of steps and tasks where the first tasks must be completed before the second task starts, and the second task must be completed before the third task starts and so forth (Henderson-Sellers and Edwards 1990; Whitten and Bentley, 2008). Henderson-Sellers (1990) argue that this traditional life cycle is broken into three major phases being the analysis, design and build phase illustrated in Figure 2.2.
Figure 2.2 - Traditional life cycle

This traditional waterfall life cycle presents the problem or opportunity defined, and then analysis is completed using customer or user requirements. This is often called the WHAT stage as in what is the product or solution that meets the customer's needs. In the design phase, as the product or solution is under design, this is answering the
question of HOW or the how stage. The design phase is the creation of a plan that
documents how the project team is going to build the final product or solution. Finally,
the build phase is the actual construction and delivery of the product or solution.

2.2.3 Six Sigma and Agile Project Delivery

The Six Sigma model is used to improve business processes to generate improved
financial results of organizations. Harry and Schroeder (2000) put forward that Six
Sigma focuses on six fundamental areas being process improvement, product and
service improvement, investor relations, design methodology, supplier improvement
and training and recruitment. The objective of this methodology is to create higher
quality products that in turn cost less to produce. As put forward by Brussee (2006) the
method employs the Define, Measure, Analyze, Improve and Control (DMAIC) phases
that are designed to give disciplined guidelines and steps for addressing a process
problem or problem statement. The define phase is used to understand and document
the project’s purpose and scope and understand the existing process. The measure
phase is used to baseline the existing process so that once a modification has been made
to the process it is easy to validate if there has been a change to the process both
negatively or positively or no change at all. Analyze is the identification of the root
cause of defects, and improve is the implementation of the designed solution. Control
is used to validate that the change has been a positive improvement as well as a
collection of lessons learned. This is a systematic and statistical process; nevertheless it
do not have any significant knowledge management procedures inherently built into
the process.

The Unified Process Life Cycle Model, based on Agile S/W methodologies, is a four-
phased interactive approach (Kohun, Wood, and Laverty, 2007). The four phases are
inception, elaboration, construction and transition and are reduplicated in an iterative
manner. Subsequently the waterfall model, as distinguished by Marchewka (2006), is
similar to the Systems Development Life Cycle (SDLC) in that it is a sequential
process. The process is a successive and sequential flow of development activities
from planning to analysis, design, build and implement. Both of these life cycles do not have any substantial knowledge management models intrinsically built into the process.

Schwalbe (2007) contends that the Adaptive S/W development life cycle is focused on the fact that the requirements of a S/W project in fact cannot be unmistakably articulated at the start of the project. This life cycle methodology is risk and change tolerant, and the requirements are hardened or firmed up as the life cycle proceeds, or as more information is available to completely understand the requirement.

The premise behind Agile Project Management (APM), as illustrated by Schwalbe (2007), is to create innovative products and solutions through the use of close collaboration between the programmers and developers and the business experts. Waters (2007) argues that agile development is about speed to market and getting revenues flowing into the firm sooner than later. Leybourne (2009) contends that managers of the twenty-first century are now aware of the shortcomings of the rational project management methodologies and project-based structure as being too constraining compared to agile development. Leybourne (2009) also maintains that the traditional project management methods are cumbersome and awkward with respect to solving the firm’s project activities within the newer need for speed to market and the time, cost and schedule demands. Agile project management is moving to an exploratory, and the adaptive project management methodology is moving away from the classical plan, then execute method, to a focused on execution utilizing a number of short, high impact iterations. APM is suited to an organization that has adaptive employees that can accommodate changing project environments and changing project requirements. APM is focused on the deliverables of the project, for example getting usable functionality completed quickly and exploring different ways of meeting the project requirements to meet the functionality needed by the customer. APM is moving toward a model based on experimentation, creativity, innovation, bricolage, being construction using a range of things that happen to be available, adaptation and learning. Another key agile development attribute is the iterative integrated testing that
happens throughout the life cycle. An additional technique as noted by Poppendieck and Poppendieck (2003) is the use of Value Stream Mapping (VSM) as part of the agile process. VSM was created out of a need for a tool in the redesign of processes in the lean production movement. The premise of the VSM tool is to reorganize production systems with a lean vision (Lasa, Laburu and Vile, 2008). The VSM process is based on five phases being the selection of the product family, current state mapping, future state mapping, defining a working plan and achieving the working plan. The goal is to create innovative products and solutions using a lean approach and methodology.

All of the life cycles noted above do not have any substantial knowledge management models built into their sequence of steps. With respect to functional and non-functional requirements, functional requirements specify what the software functionality must do (Wiegers, 2003), and non-functional requirements specify the quality that the product must have (Robertson and Robertson, 2006). However, the requirement to create, document and most importantly, move this knowledge from person to person, group to group, team to team and department to department is currently not visible or prominent in these life cycle methodologies. It is therefore necessary that a knowledge management overlay model is required to ensure that requirements are created and traversed effectively. It is essential for the information to not be distorted and confounded as it moves through the process.

The way that systems development and design methodology is approached also has a strong influence on the success of projects. As noted by Schwable (2007), a systems approach is to a greater extent a holistic and analytical view of solving a complex or ill-defined problem. A project is not implemented in isolation within an organization, it is implemented as a component within a larger “system”, and as such, requires that all stakeholders understand the influence and impact of any project or change to the overall system. The Project Management Body of Knowledge (PMBOK®) does not have any reference to a knowledge management model for customer and user requirements (PMI, 2008a) however, the PMI (2008b) Program Management Standard does make note of the need for a knowledge repository.
In 2009, in a context of a new lean and flat business environment, project teams are required to complete their cycles extremely quickly. When this works well, the benefits to the organization are twofold: speed to market and revenues can be obtained sooner rather than later. The difficulty, when this does not work well, is that the project falls well past the scheduled end date, and cost overruns can be horrific because of missed or poorly understood requirements, and the need to re-work these requirements once the developers or software coders are writing, or have written, the code. This is a spectacular and daring gamble by senior management that seems willing to take the risk in many cases. The payoffs are enormous in the senior manager’s eyes, the contrary entails great loss. There is a need to understand and create processes for project teams to meet the needs of the business, achieving speed to market, as well as giving the project team the ability to deliver. Project teams need to become effective at understanding and resolving an ill-defined problem with respect to customer and user requirements to create and document the business and system requirements at the forefront of the project life cycle.

With this emphasis for speed to market, project teams must integrate all the project management components and processes, as well as the system and business analysis functions, components and processes that have formally been segregated between business segments. These two functions are now blending and blurring into each other within many North American organizations. With this amalgamation, there are a number of chronic problems within the organizations including the organization where this author was previously employed at the time of the thesis. The basis for the case study used for this thesis is a large organization aptly named XYZ Telecom Firm, for the purposes of this thesis, and the introduction of a smaller group within the firm, for the purpose of this thesis, named Lean Project Management Team (LPMT), being a group of less than 100 subject matter experts, Business Analysts (BA), project

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5 XYZ Telecom Firm and LPMT Project Team refer to employees, departments and organizations within this thesis. All employees, departments and organizations have been changed to fictitious names for confidentiality purposes.
managers and Project Leads (PL). This smaller team was part of a test case cooperative unit to examine and endeavour to as one of its many mandates, to reduce the cycle time of products getting to market. These new product releases are built around a project delivery team using existing project management tools and techniques.

The triggers or inputs into this LPMT team come from two major sources, the first being New Product Introduction (NPI) and the second being Network Direction and Investment (NDI) departments within the organization. These are two common departments that feed into an implementation team or project that create the processes to actually implement the final solution to customers. The new product introduction team conceives of new products or functionalities to an existing or new customer solution. Immediately following the request for NPI, the LPMT project team creates a scope statement from the feature sets and billable features for the customer as set out by the product team (their wish list). After a formal project kick off (K/O) meeting, if an existing process exists, the LPMT project team creates a conceptual solution for the new product or functionally with high-level details with respect to the existing process. If an existing process does not exist, a new process is created. Next, the LPMT project team creates and describes the business requirements which are signed-off by the product team. Subsequently, the LPMT project team creates and describes the system requirements. As the LPMT team works this process, they continue to refine the scope. At that time, all of these critical activities are completed without a knowledge management model to ensure the sound movement of information from a requirements perspective.

2.3 The Relevance of Lean or Agile Practices within Software (S/W) Projects

Within my 25 years as a practitioner of project management, my experience maintains that the dichotomy to a waterfall life cycle is the lean software development or agile project management that is built on a number of fundamental principles that differ significantly from the traditional waterfall life cycle. The objective of lean S/W
development or lean project management, as explained in the literature cited in Section 2.2.3 above, lean development is utilized to reduce the time to market for a new customer product or solution. In addition, with lean S/W development, there is an understanding and acceptance that requirements will change in the course of the project. Finally, agile software development is about producing immediate value(s) to the customer and anything that that project does that is not adding value to the customer is considered waste or is not needed and is not done. The waterfall methodologies lock in requirements early in the life cycle and require a change process to adjust or modify the requirements. Inherently, there are a number of tangible advantages to an organization that can successfully undertake these lean activities. The first of these advantages is that a product or solution can get to market faster, and the firm will begin generating revenues more quickly. The project is more flexible with respect to changes to the user requirements. There is also an inherent increase in risk for these types of projects as many tasks are completed concurrently. Finally, as the project team works through the project, they have the option of changing or completely removing some requirements or scope. The belief is that if the project team in fact does not need to develop a useless or near useless requirement, and if they do not, there is an overall reduction in the cost to complete the project as a number of requirements of little or no use are dropped from the scope of the project, as well as the monies to complete the requirement.

2.3.1 Agile Software Development

As outlined by Kent (2001), agile software development starts with four unique value statements. The first is that agile development focuses on individuals and interactions over processes and tools. Second, working software is more significant than comprehensive documentation. The third value statement is that customer collaboration is more substantial than contract negotiation and finally, agile development gives more value to responding to change over following a definite and unchangeable project plan. The agile methodologies or school of thought is the direct antithesis of more structured methodologies such as the PMBOK® body of knowledge,
which is more focused on a waterfall life cycle that has distinct phases for initiating, planning, executing and closing. Agile methodologies rely on emergent strategy rather than a rigid design strategy for waterfall approaches, where each phase is generally locked in before the next phase begins (Mintzberg, Ahlstrand and Lampel, 1998).

Agile development is a systems development strategy wherein the system developers are given the flexibility to select from a variety of appropriate tools and techniques to best accomplish the tasks at hand (Whitten and Bentley, 2008). Agile development is believed to strike an optimal balance between productivity and quality for systems development. The principles behind agile software development are that the work or the development is completed in short iterations from one to two weeks, and referred to as a Sprint. The premise is that at the conclusion of each iteration, something must be delivered as a functioning, tested, and integrated software component. The something is considered to be ready-to-deliver S/W functionality that can be given to the customer. In most cases during the early iterations, this functionality is in fact not delivered to the customer; only demonstrated to the customer. Nevertheless the argument is that it is functional and would be acceptable to deliver to an end user or customer. The team focuses on the business priorities, as established by the product owner, and the team continually inspects and adapts the requirements from the product backlog during each iteration. The trade-off for this methodology, versus a more structured waterfall method such as the PMBOK® method, is that agile development has difficulty predicting or estimating the final scope, time and budget or functionality at the beginning of the project due to the constant adjustments the project team continually makes as the project progresses. Agile development is extremely receptive to changes, to the scope, functionality, quality, time, budget, metrics and benefits, because the focus is on the customer’s expectations. This is due to the instability of S/W related technologies and the complexities of S/W related requirements (Schwaber and Beedle, 2002). The argument is that as requirements are change or removed, there is no need to develop a useless or near useless requirement. In the waterfall life cycle, the requirements are completed and signed off in the planning stage and are locked in from that point forward. If there is a change to the requirements after the planning
phase, a formal change request process is needed to make requirement adjustments. The adjustments also take into account any increase or decrease of scope, cost, schedule, benefits or functionality. In agile software development, the requirement can be dropped completely from the scope of the project with no formal change request process. The validity of agile over waterfall is anchored in the arguments made by Mintzberg, Ahlstrand, and Lampel, (1998) that argue that in high turbulent contexts, a rigid designed strategy is dangerous and risky, and an emergent and flexible strategy is far more effective. Andersen (2008) also makes this point in a wider project management context that includes turbulent IT development projects.

Estimating within an agile environment applies user stories that are then constructed into story points, as the starting point for estimating duration. The user story is customer requested functionality, or in the systems development and design methodology, a user story is a customer requirement. Story points are based on a relative value and not actual duration. For example, a story point of four is twice as big as a story point of two. As outlined by Cohn (2006), the team starts by assigning an average or medium size story with the value of five on a scale of one to ten. Other stories are then given a value over or under five if the story is larger or smaller than the median story point. It is this median story point that is the reference point that all other story points are equated against. Once all of the stories (requirements) are given story points, a velocity measurement is added. The velocity is a measure of the team’s rate of progress per iteration. With this data, the team can estimate how much work can be completed in subsequent iterations, thus building out a schedule. Estimating using this agile technique delineates the estimation of effort from the estimation of duration making the estimation a relative measure using story points and velocity.

As with any project from waterfall to agile, there will be customers or end user requirements. The methodology used to create the requirements is of no significance to the knowledge transfer model. If a project has customer or end user requirements, the knowledge transfer model can be implemented.
2.3.2 Rule Out Waste

The goal of lean development is the elimination of waste (Poppendieck and Poppendieck, 2003). As noted above, agile software development is about producing value to the customer and anything else that that project does, that is not adding value to the customer, is considered waste and is not needed. For example, systems development is considered waste as it is not adding value to the customer. In lean development, the first step is to bring the waste to the surface making it available for reduction or elimination. Poppendieck and Poppendieck (2003) identify seven wastes in agile development; partially completed work, extra processes, extra features, task switching, waiting, motion and defects.

Figure 2.3 - Waste in agile development (Poppendieck and Poppendieck, 2003, p.7)
Partially completed work represents any development that has started but is not finished. It is pointed out that these incomplete tasks tend to become obsolete and just drain away resource time on product functionality that will never be used. Extra process is any process work, such as documentation, that has little or no value to the customer. Extra features are a chronic problem with software development, as the project team or stakeholders add in a new feature that has little value. Any nice to have features should be eliminated or pushed to a second release. Task switching is another source of waste. Having resources work on more than one project causes the resource to start and stop as they move from task to task. This starting and stopping has a negative cost. Waiting is one of the biggest wastes in development. If there are delays in sign-offs, documentation, testing, whatever the case is, waste is a non-value added activity that needs to be eliminated. Finally, motion is considered a waste. How many task transfers in a sequence are required to get a task completed? Does the process state that it must pass between five people, six, or ten? Is the team collocated into a single room where knowledge transfer happens quickly and effectively, and the team gets answers in real-time or is it a virtual team? Each of the tasks listed are considered of no value to the customer, and agile development focuses on the elimination of each of them without reducing the value of the product or solution to the customer.

2.4 The Systems Development Process

This section provides a brief explanation of the systems development process. This thesis will focus on the systems development or systems analysis and design mythologies as well as associated processes and procedures. The thesis will focus on the project management process for implementing projects, as outlined by the Project Management Body of Knowledge (PMBOK®) that will be discussed in the next section. Whitten and Bentley (2008, p. 44) describe a simplified high-level, generic process flow as seen in Figure 2.4. Typically, the systems development process involves the scope definition, problem analysis, requirements analysis, logical design, decisions analysis, physical design and integration, and installation and delivery. There
are many sub-phases such as system conceptualization, scope and vision, business requirements, testing, training, that are also a component of the systems development process. This process flow is generally altered by industry and organizations to fit their individual needs.

Figure 2.4 - System development life cycle (Whitten and Bentley, 2008, p.44)
The scope definition phase is where the business problem or statement is created or presented to the project team. A conceptual solution is also embarked on during this phase and is the lead-in of the problem analysis phase. The scope of the project is defined and documented as well as the Work Breakdown Structure (WBS), the budget and schedule. Failure at this phase to clearly outline and document the scope of the project will have lasting negative implications downstream during the project implementation phase. The requirements analysis phase of the systems development process is the continuation of the gathering of information, understanding and a deeper dive into the details of the business problem. This phase moves from the conceptual solution and evolves into user requirements. The scope statement, WBS, budget and schedule can also be updated with the refined knowledge of the final project solution. This phase ends with one of a number of go-no-go decisions during the project implementation. The logical design creates the System Requirement Specification (SRS) document based on the inputs from the problem analysis and requirements analysis phase as business or user requirements. The final phase is the implementation of the designed product or solution that has been conceived in the previous phases. In many cases there is a hard transfer from the development or systems analysis team to the project team, and it is the project team that actually implements the final solution. This inherently introduces a point of potential inadequate knowledge transfer that will be discussed shortly.

Once the project is implemented and placed into production, there is a control phase that is used to ensure the solution, product or application does in fact does perform to the specifications, as well as the end users’ expectations. Once this warranty period is completed, the project team is disbanded, and the solution is then supported and improved upon like any other production system, tool, or application.

A key departure between the system analysis and design process, and the project management process, is the statement of work that encompasses the scope statement, the problem analysis and the business requirements statement that includes the
requirements analysis and logical design (Whitten and Bentley, 2008). The fourth edition of the PMBOK® Guide has been updated within the scope management knowledge area with a new section regarding the collecting of requirements within the planning process group (PMI, 2008) although not with the rigor surrounding the system analysis and design process. System analysis and design is extremely focused on the various requirements being business data requirements, process requirements, interface requirements and is considered the most important phase of systems development as put forward by Whitten and Bentley (2008). Robertson and Robertson (2006) argue that requirement gathering and systems analysis overlap with the requirements being collected, and are performed via analysis models. It is the gathering and verification of the business goals and qualities of the product or solution that is being collected and documented into the requirements.

The systems development life cycle is an alternative methodology of project development, used generally used to implement software and information technology projects. The systems development life cycle uses a process that includes a design architect or analysis phase that gathers information on how the system should work and identifies inputs and documents data flows that are then used to document the logical design of the new or adapted system. Figure 2.5 is another generic depiction of the systems development life cycle (Net Link Group, 2009). In this example the process is an iterative process that focuses on the customer requirements and needs at the front end of the process. As noted by Figure 2.5, the life cycle process is based on a systems theory and is used as a generalized approach to problem-solving. This systems development life cycle does fall under the overall title of a waterfall model.
The system development and design process is generally completed in a logical format with a number of go-no-go decisions that require sign-off from various groups, stakeholders and customers. As described by Jonasson (2008), each of the major phases can be completed as its own mini project. As well, compared to the PMI® methodology that will be discussed in the next section, in the system development and design process, there is a much more prominent role for both the business analyst and systems analyst with respect to requirements gathering and documentation.

2.5 The Project Management Body of Knowledge (PMBOK®) Process

The formal project management discipline by and large uses the Project Management Institute worldwide PMBOK® Guide (PMBOK Guide, 2008). The PMBOK® is the project management body of knowledge that outlines the tools, techniques and
processes to successfully plan, execute and control a project. PMI® is extremely active in the project management community that includes research, standards, professional credentials, professional development, and the sharing of ideas and experiences between members. There are over 250 PMI® Chapters worldwide and many communities of practice and Specific Interest Groups (SIG’s) where project managers share professional interest by industry sector\textsuperscript{6}.

PMI®’s Guide to the Project Management Body of Knowledge - fourth Edition, 2008, often called the PMBOK®, is described by PMI® as the recognized standard for the project management profession. The document provides guidelines for managing projects and defines project management and related concepts, the project management life cycle and the related processes, and does so in great detail (PMBOK Guide, 2008). Also, the PMBOK® gives a common language to project management, and for the project managers that use this body of knowledge, this is the guiding document for PMI®’s professional development programs and certification, such as the Project Management Professional® (PMP®) certification. It is noted that the PMBOK® document and guidelines are to be used as a general strategy, and that guiding principles can be incorporated across any type of project. These principles can be removed and added, as required. As stated in the introduction to that guide, the standard is a guide and only considered a body of knowledge and not a methodology (PMBOK Guide, 2008).

PMI®’s generic life cycle, being a set of sequential project phases, is established on five process groups being initiating, planning, executing, monitoring and controlling, and closing. These process groups are performed in sequence and have dependencies between each other. This life cycle is considered a waterfall life cycle as seen in Figure 2.6, the initiating phase is used to define the project with the identification of project stakeholders and the creation of the project charter.

\textsuperscript{6} PMI Home Page (2010) http://www.pmi.org/GetInvolved/Pages/PMI-Chapters-and-Communities-of-Practice.aspx
Figure 2.6 - Generic project life cycle II

The planning process group of processes and activities is used to establish the scope of the project including the effort to compete the project. The process group also involves the conception and construction of the project plan, requirements gathering, activities identified, estimation of work effort, work breakdown structure, cost management, risk management, human resource management, and communication that all contribute to the creation and documentation of quality project plans. The executing process group involves the managing and the implementation of all the project activities to meet the product or solution’s scope. The monitoring and controlling group processes track, review and regulate the performance of the project over the duration of the project. The final process is the closing process group that is the formal steps and process of closing.
the project. Such tasks could include acceptance and signoffs from the customer on the final product or solution, lessons learned on the overall project, and any closeout documents. This generic life cycle is based on five general process groups that can be used on any project from software projects, to construction, to process improvements.

There is open criticism regarding the PMBOK® due to the generic approach of the document. Hatfield (2007) argues that the PMBOK® should focus more on project-related topics such as scope, schedule, cost, risk, and leave other disciplines such as human resourcing and procurement, to those domains. Hatfield (2007) also states that the PMBOK® is more of a reference document written in an anaemic, bland and weak writing style. The points above are that the PMBOK® does not hold all, if not many, answers to project management process effectiveness and is one of a number of such tools and guides. Others have criticised the PMBOK for being too limiting and not in line with the lived experience of many project managers (Morris, 2001; Winter and Thomas, 2004; Hodgson and Cicmil, 2006).

PMI® claims that the PMBOK® is a “body of knowledge generally recognized as good practice” and is a “foundational project management reference for its professional development programs and certifications” (PMBOK Guide, 2008, p. 4). PMI® believes and states that the PMBOK® is easy to understand, and is a foundation for project management practitioners. It is well written through the collaboration and knowledge of practicing project managers. Thus the validity of accepting the general acceptance of the existence of a number of project management processes in the life cycle, and the attention specifically to project requirements as a valid focus of interest for the thesis.

Now that the thesis has established that there are a number of existing project management life cycles, the next area for review is project requirements. As defined by the system analysis and design methodology, a requirement can be a functional requirement that is something the system or software application must address. A non-functional requirement is a property of quality the system must have such as the
performance level (Whitten and Bentley, 2008). A non-functional requirement gives the specification of how well a software system must function (Miller, 2009). Agile development calls requirements story points (Cohn, 2006). As characterized by the PMBOK®, a requirement is a condition or capability that must be met or possessed by a system, product, service, result or component to satisfy a contract, standard, specification or other formally imposed document (PMBOK Guide, 2008). Requirements and their unambiguous definition are essential to successfully managing IT projects.

2.6 Project Requirements

Business requirements, or the project goals, document what the stakeholder(s) needs are for a product or service. The requirements make up the solution that the stakeholder is looking for the project to produce. Business requirements are written in the language of the client, in plain language, which the customer can understand. The business requirements are the words of the customer and not the words of the business analyst or project manager. The business requirements state the attributes, capabilities and characteristics of the requirement. Business requirements then evolve into functional and system requirements. Functional requirements are the attributes that the product or service must actually do as put forward by Robertson and Robertson (2006), and system requirements are the requirements for the system and what and how the system must function to solve the business need.

As stated above project requirements come in two central categories being functional requirements and non-functional requirements. A functional requirement, as defined by Robertson and Robertson (2006), is a requirement that must do something to satisfy the need of the customer or project outcome. It must have a utilitarian outcome or useful attribute with respect to the customer needs. A non-functional requirement is one that again is mandatory to meet the need. A non-functional requirement determines how the product or solution is to behave and what performance and qualities it will display (Robertson and Robertson, 2006; Wiegers, 2003).
With respect to the quality of a project requirement, the Software Engineering Institute argues that a sound valid requirement must have stability, completeness, clarity, validity, feasibility, precedent and scale (Carr, Konda, Monarch, Ulrich and Walker. 1993). Stability refers to the degree that the requirement is changing and how that change will impact the final product or solution. A stable requirement is the goal. Completeness represents if the project includes all of the requirements identified and understood and whether the customer or end user have expectations that are not covered by the existing requirements. Clarity of the requirement is also a key consideration, without a clearly written and well understood requirement, easily transferable to another individual or group, rework will be required and in many cases, this rework occurs much farther down into the development life cycle causing additional costs. As argued by Weinberg (1992), 60% of the errors created downstream to the project are due to incorrect requirements at the beginning of the life cycle.
Validity refers to whether the aggregate requirements in fact are representative of the customer intentions for the product or solution. In many cases, there is a misunderstanding of the written requirements by the customer or end user. Feasibility addresses if two requirements by themselves are viable, but together they are not because of conflicting requirements. Precedent attends to which capabilities of the requirements that has not been successfully implemented in any existing systems or is new to the project team that is implementing the new product or solution. There is increased risk with requirements that are considered new or novel that have never before been attempted by the organization. Finally, scale is the ability to manage both
the technical and the management challenges of a large and complex project. As project complexity grows, so does the complexity of all of the technical and project management processes. With these requirement principles fully understood, as outlined by the Software Engineering Institute, project managers have a gauge to measure the quality of the project requirements and can formulate plans to mitigate any insufficiencies. Appendix B and C give a breakdown of the requirements taxonomy process flow and details of the lower levels of the nomenclature.

In addition to the standard functional and non-functional requirements, there are also a number of other categories of project requirements. Of interest to this thesis, from a knowledge transfer perspective is the business and user requirements. Jonasson (2008) describes the business requirement as strategic, tactical and operations requirements that answer the question such as, where is the business heading and how will the strategic goals be met from a tactical perspective, and once the requirements are implemented, will the day-to-day operation of the organization operates. Reich, Gemino and Sauer (2008) highlight the need for business knowledge as well as project management knowledge and technology knowledge to be synchronized and aligned so that a full picture of how the project can be developed is gained. Without this, there is a danger of asymmetries of knowledge causing misunderstandings and errors that require resource and time consuming rework. The end user or customer requirements are what the user will ultimately do with the product or solution. In most cases, it will be a tool to do the job that will be comprised of valuable and insightful pragmatic knowledge about the business context. These requirements are created in the language and the voice of the customer, and documented in their own words, versus in technical jargon. The customer or end user articulates their needs to the business analyst or project member who in turn must be able to document them effectively without the loss of knowledge through the transfer. This is the foundation of other requirements such as system requirements, discussed below. Not only is it imperative that the end user completely and coherently articulate their needs, it is also up to the business analyst or project team member to be able to pull the needed information from the end user. This need for knowledge transfer is absolutely required for clear understanding of the end
user’s needs that can be pushed through the many project phases without distortion. In some cases, the end user may articulate that they need to “take a customer call and input their information into a database”. It is up to the business analyst to understand what information is required from the customer that needs to be input into the database (Wiegers, 2003). Tuli (2007) argues that in most cases, the customer may not even know what it is they want. In this case, it is important to ask not only the right questions, but also to have a number of customers or end users in the interview. There is also the need for the business analyst to understand the overall business needs of the customer and end users, as well as their internal processes, labour situation and business models for both today and their future business needs. As well, as the complexity of the requirements increase, so does the need for the business analyst to ensure the knowledge from the end user is pulled and is complete and most importantly, addresses the end users needs. If the requirement does not meet the need of the customer or end user’s, the requirement will fail. Systems requirements are considered the top-level requirement and are used to view the entire system from a holistic perspective. A product or solution may have both hardware and software components as part of the solution, and the system requirements represents and describes the overall product as a whole entity (Wiegers, 2003). There are also a number of additional requirements such as legal, industry standards, marketing and corporate policies that may also need to be met by the project team.

With all requirements, there can be an inadequate knowledge transfer at any point in the process of requirement gathering, creation, documenting and traversed between various groups in an organization such as marketing, technology, project team, coders or development teams that will negatively impact the quality of the requirement and ultimately the end product or solution. As the requirement is passed from person to person it is watered down, and the validity is thus negatively impacted with respect to the customer’s expectation. In the end, the requirement may not meet the customer’s satisfaction, and the entire product or solution can be compromised to the point of project failure from the perspective of the customer.
2.7 Knowledge Management (KM)

From a business knowledge perspective, organizations are interested in the connection between intellectual knowledge that employees of an organization possess, and how additional profits can be generated from this knowledge. This includes both the knowledge as well as the processes surrounding the storage and cascading of the knowledge throughout the organization (Dalkir, 2005). As changes occur outside and inside an organization, there is a corresponding need to change organizational practices and culture within the organization to stay competitive. In addition knowledge is needed to understand and exploit new products and technologies, improve performance and adapt to turbulent conditions (Merriam, Caffarella, and Baumgartner, 2007). Nonaka (1991) and others such as Nunes, Santoro and Borges (2009) argue that it is knowledge that gives an organization a competitive advantage in an environment that sees markets shifting, technologies in constant flux and products becoming obsolete overnight. It is this need to take employees’ personal knowledge and transform it into organization knowledge that gives the firm a competitive advantage. By taking individual tacit knowledge, the knowledge that is implied and buried deep within a person and redistributing it within the firm to productive use, an organization becomes a knowledge creating company (Nonaka, 1991). Tacit knowledge is unobservable and is private to the owner and difficult to transfer to other people. An example of an attempt to transfer tacit knowledge would be one person explaining to another how to swim or hit a successful golf shot. Scharmer (2001) also states indirectly that there is a self-transcending knowledge that the person does not know he or she knows, such as inventing a new and innovative product or solution. The person has the product or solution buried deep within oneself, and basically unknown to others. This can be seen as relevant to this thesis because the business users and those capably of articulating business requirements possess much of this kind of knowledge.
As seen in Figure 2.8, explicit knowledge lies above the line and is apparent and can be easily codified and written and passed onto other people. From a project perspective, Reich and Wee (2006) contend that even down to the project level, knowledge practices positively influence a project’s outcome; they note that the PMBOK® guidelines have a strong emphasis on explicit objects as well as a number of other knowledge management concepts such as socialization, externalization and internalization within the text. Knowledge management is the discovery and distribution of all of the embedded insights, deep perception of situations and experience that the employee base holds, and is then systematically distributed to the entire organization giving the firm a competitive advantage over a comparable firm that does not employ a knowledge management methodology (Reich and Wee, 2006). The entire subject of knowledge management is contested, and this is because there is a vibrant argument about whether knowledge assets can be managed or whether information management and those using this information re-frame information into knowledge that is their interpretation of what they perceive, given their lived context using knowledge artifacts such as memory aids,
notes, jottings, formal systems and lessons learned (Koskinen and Aramo-Immonen, 2008).

Two other concepts are important to note. One is situated learning in which knowledge is generated, refined, re-framed and used through development and applied “in-use” that is as a lived process in which people interact and exchange ideas and perceptions about their daily work life issues and challenges. There is a broad body of literature about situated learning that while interesting is beyond the specific scope of this thesis. Interested readers should refer to (Lave and Wenger, 1991; Wenger, 1999; Sense, 2005; Sense, 2007). The main point is that people in complex situations in which knowledge or perception exchange is vital for progress, learning from situations and experience is vital. As illustrated in Figure 2.8, much of this is hidden and needs a way in which it can be explicited and shared to take advantage of further reframing to make better sense of these unique experiences. The second concept relates to knowledge transfer and “stickiness of knowledge” that will be discussed later in Section 2.7.3.

2.7.1 Tacit Knowledge and Innovation

Tacit knowledge, as noted in Section 2.7, is knowledge that is difficult to articulate into normal language and is buried deep within the person. Koskien and Vanharanta (2002) argue that tacit knowledge can be articulated through metaphors, drawings, and a number of other expressions, versus merely exchanging words. Koskien and Vanharanta (2002) also argue that employees in an organization go to the people who are “in the know” and not to an explicit repository of knowledge, such as documents or a database when they are looking for knowledge. This tacit knowledge exchange is important with respect to the introduction of a new or improved product or solution. Innovation is the creation or invention of a new product or solution. The exchange of tacit knowledge at the start of the innovation process, through face-to-face, informal interactions between employees and coaching, versus directing employees, facilitates the exchange of tacit knowledge.
2.7.2 Types of Knowledge

As well as the three forms of knowledge listed above, being explicit, tacit and self-transcending, Zack (1999) argues that there are also types of knowledge.

Table 2.7 - Knowledge types

<table>
<thead>
<tr>
<th>Knowledge Type</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Declarative</td>
<td>Know about</td>
</tr>
<tr>
<td>Procedural</td>
<td>Know how</td>
</tr>
<tr>
<td>Causal</td>
<td>Know why</td>
</tr>
<tr>
<td>Conditional</td>
<td>Know when</td>
</tr>
<tr>
<td>Relational</td>
<td>Know with</td>
</tr>
</tbody>
</table>

Further to the knowledge types listed in Table 2.3, Zack (1999) goes on to describe knowledge as being core, advanced and innovative. These classifications can be used to describe and classify an organization’s competitive knowledge. This competitive knowledge gives the organization a competitive edge against a similar firm that does not evaluate this condition. Core knowledge is the minimum knowledge that an organization needs to compete in their market space and at a lesser advantage to their rivals. The advanced knowledge gives the firm the ability to viably compete, and at least be an equal to their competitors. Innovative knowledge gives an organization the ability to lead in the market space and to significantly differentiate the firm from their competitors.

Knowledge is not static, and organizations must continue to reinvent themselves as the innovative ideas, products and solutions of today will become tomorrow’s core products. Firms need to continue to grow their knowledge base by continuous learning.
and knowledge transfer and the cognitive process of acquiring new skills and knowledge.

Figure 2.9 - Strategic knowledge framework (Zack, 1999 p.261)

The strategic knowledge framework depicted in Figure 2.9 illustrates how one firm is doing against another, being their competitors. The second function of the strategic knowledge framework is the ability for the firm to review historical comparisons between their own firm and competitors, as well as plot out future comparisons. The strategic knowledge framework can then be used as a strategic framework for mapping knowledge types within the firm as compared with their competitors. The firm can then align its corporate strategy to what the organization knows. If there are gaps between the strategy and the knowledge capabilities, a plan can be created to move the organization from core knowledge to advanced and finally to innovative knowledge.
2.7.3 Motivation, Trust, Commitment

Maslow (1943) identified intrinsic motivation as part of a desire for ego needs and self-actualization, as higher-order motivation. Meyer and Allen (1991) identify effective commitment as being the highest order of commitment where people do something out of their intrinsic motivation. Barbuto (2005) describes motivation as a five-part psychological feature that arouses a person to action toward a desired goal. The first of these sources of motivation is an intrinsic process, second instrumental, third self-concept external, fourth self-concept internal and finally goal internalization. Becker (1960) argues that commitment can influence both individual and organizational behavior impacting single employees and groups. Commitment influences power, religion, bureaucracy and political behavior, and can be defined as a consistent behavior. The consistent behavior persists over a period of time, and the individual believes that the behavior is right or proper in their social group, and deviation will result in punishment. Commitment also drives individuals to adhere to social or corporate norms. McKenzie, Truch and van Winkelen (2001) argue that commitment is driven by:

- An internal belief in something
- Adherence to a personal value such as loyalty, honor or responsibility
- Some compelling extraneous motivating force to act in a way that is consistent with commitment

The strongest form of commitment occurs when both emotional and intellectual rationale are in use, and commitment can be shattered and damaged beyond repair in a single moment in time. Building commitment involves positive feedback, implicit motivators and emotional predisposing. Knowledge management uses commitment driven through the use of communities of practice and social networking and small group workshops (Shaw and Edwards, 2004). Additionally, Shaw and Edwards (2004) point to the need for top management high level commitment and involvement as well as alignment of the core business needs.
Motivation is a goal oriented human behavior. As argued by Maslow (1943), motivation’s lowest level is to reduce physical discomfort and maximize pleasure. At its highest level, it is the discovery of self-actualization and personal fulfillment. In a practical sense, motivation and commitment can influence both individual and organizational behavior.

Along with motivation and commitment, trust has many important benefits for organizations and the people that work within them. The benefits of trust within an organizational setting include social capital being, reducing transaction costs, increasing spontaneous sociability and facilitating compliance to the firm’s authorities (Kramer, 1999). Reduction of transition cost implies that when a commonsense rule is in place, and the people within an organization are given the benefit of the doubt regarding trustworthiness, the organization overall will benefit. Spontaneous sociality refers to cooperation and working above expectations within the workplace resulting in an increase in the practice of cooperation and going that extra mile for the firm (Schmidt, 2004). Finally, the facilitation of compliance is the respectfulness to organizational authorities. Schmidt (2004) also argues that there are a number of barriers to trust being suspicion, surveillance systems, breaches in contracts and the fragility and vulnerability of trust. Suspicion makes people question the intentions of the people around them, reducing their trust level.

Partners and partnerships come in numerous, wide-ranging and in some cases, unusual arrangements. Hodge (2004) gives a detailed and insightful presentation of the relationship between the private and public organizations, in which he addresses how the Australian State and Federal governments are using private finance arrangements to fund enormous infrastructure projects. Public-private partnerships (PPP) are “defined as cooperative institutional arrangements between public and private sector actors” (Hodge and Greve, 2005, p1). Although this is not a new concept, it is one that uses highly complex contractual arrangements. As well, at least in theory, the risk is moved to the party that can best manage it and is paid a premium to do so. A number of these types of arrangements have not gone well. For example, an Australian project called
the City Link Infrastructure Project ended with a number of legal disputes, and the project became politically conflict ridden. The dichotomy was due to the government crash through culture and passing the risk to the private sector. In the end, this arrangement had minimal trust and confidence between the two parties. It was only the complex contractual arrangements that gave the parties the rules of engagement or the valid component of trust. Ultimately, it was the numerous lawyers that lined up to defend and prosecute what turned out to be many legal disputes. This is another example of the diversity, complexity and intensity of trust.

Motivation, trust and commitment are all important and influential factors that impact both individuals within an organization and the organization overall. Maslow’s (1943) theory of self actualization postulates that humans are always working to move up to their full potential. As well, trust and commitment enhance cooperation, collaboration and teamwork within the firm.

2.7.4 Trust and Partnerships

Willcocks and Choi (1995) reason that co-operative partnerships are established from the need for a strategic alliance. A strategic alliance is a relationship of mutual interdependence. This relationship cannot solely rely on a trusting partnership between the parties, hence the need for a contract, either written, verbal or implied, of some description. In Anglo-Saxon societies, the contract and the subsequent measurement framework is vital for the foundation of an outsourced relationship, and greatly increases the quality of the affiliation.

Regarding the PPP discussed above, one of the lessons learned was that there was more rigorous and controlled governance required to be in place. Strong governance creates a body for the purpose of administering the relationship. It is the rules of engagement for the parties, or as Winch (2001) describes it as being, “the rules of the game”. This is the verify component in the trust but verify statement. Governance, with respect to partnerships and alliances for organizations that are working together, is a requirement
to control the relationship. Winch (2001) also argues that by engaging a professional governance process to manage the governance policy, this is in effect creating a number of advantages including a relationship perspective. The professional governance management process offers and creates the environment of a higher trusting relationship between the parties. Likewise, complex contracts are created not only to specify authority systems to facilitate change; they also build the policies and procedures for conflict resolution. Trust, as outlined by Winch (2001), is composed of two components, being self-interested trust and socially-oriented trust. Self-interested trust is created and strengthened through repeated transactions between the parties as they become increasingly more comfortable dealing with and working with each other. Socially-oriented trust, although not as affecting in a business setting, deals with social and family networks. Public-private partnership relationships can be enhanced through the use of a professional governance process that offers increased trust via professional validation, grievance processes, and the use of professional codes of ethics.

As noted in the section 2.7.3 of this thesis, the term trust is an abstract word with many meanings. The research within the fields of organizational behaviour, sociology, psychology, anthropology, and even into the discipline of philosophy, with respect to the study of trust, is copious at best. With respect to trust in the work environment, trust can be defined as being a positive expectation of a person’s conduct and behaviour, with distrust being corrupt, immoral, and something to be avoided. Lewicki, McAllister, and Bies (1998) reason that trust is a need, or necessary ingredient if one wishes to develop and sustain a strategic partnership with other organizations. Along with trust, the dichotomy is that of distrust. With the globalization within North American industries, outsourcing and downsizing, especially with the incumbent telecommunication organization, has bred a strong distrust within the industry. Employees will not trust the senior managers whom they feel are reviewing an inventory of names of employees, which may include themselves, that are next on the termination list. Over time, and through the interactions between two people or two organizations, the two will continue to grow and trust (or distrust) each other through their experiences dealing with each other. As an example, trust can be enhanced
through a number of avenues including the open and honest sharing of information and the transfer of knowledge. Szymczak and Walker (2003) argue that in an enterprise organization, with respect to a change initiative, trust can be generated through the sharing of knowledge. This also generates a “cross-fertilization” of information and ideas within the organization. Lewicki et al (1998) note that both trust and distrust can exist simultaneously, and they are both used to manage uncertainty and complexity. In closing, the research on trust is a prominent body of knowledge with many schools of thoughts. This foreshortened discussion outlines the overview of thoughts and research on trust and distrust, the sharing of knowledge, and transfer of that knowledge. Humans exchange knowledge more opening and freely with those they trust and will resist contact and exchanges with those they distrust. If the receiver of information does not have this trust in the sender, he or she is less likely to accept the information of knowledge they are receiving. As argued by Szulanski (2000), trust is a source of knowledge stickiness through the relationship between the source and recipient. If the relationship has a strong sense of trust and commitment, there is a strong correlation with the positive transfer and retention of knowledge as noted in Section 2.7.3.

2.7.5 Innovation

Innovation from a business perspective, as defined by Dundon (2002), holds four key ingredients being, creativity, strategy, implementation and profitability. Creativity is the creation or conception of a new idea. Strategy is the understanding that the new innovative idea has value and could be used to fulfill an end user or customer’s need. Implementation is the act of executing on the new innovative idea. Finally, profitability is to ensure that the outcome of the new idea will bring to the organization some tangible value, typically in higher profits for the new product or solution. Innovation is spawn through creative thinking and creative actions. Kiernan (1999) argues that today’s organization needs to consciously create strategies that promote innovation within the organization, by leveraging the knowledge workers ability to think innovatively and to exploit the twenty-first century’s information and communication infrastructures.
Leonard-Barton (1992) postulates that learning organizations create learning laboratories that are used to create, collect and control knowledge. This includes process, knowledge and skills, the many non-technical aspects of management practices, and the values that support the knowledge base. This organically whole learning laboratory is in constant flux and endlessly reinventing itself. With heavy management involvement, this environment uses holistic system thinking as its foundation. There are four activities that are needed for the learning laboratory:

1. Problem solving
2. Internal knowledge integration
3. Innovation and experimentation
4. Integration of external information flows

Each of the activities listed above are interrelated and aligned with the values and management systems of the organization. Leonard-Barton reiterates that for a learning laboratory to be successful, it needs to be a totally integrated system with participation from the chief executive office down to the front line workers of the organization. The entire firm needs to embrace the creation, sharing and control of existing and new novel knowledge. Leonard-Barton also discusses core capabilities within an organization. Core capabilities are linked to an organization’s strategic plans and have been well researched in the past. In addition, core capabilities are considered to be constantly evolving.

Leonard-Barton argues that there is a paradox between organizations’ core capabilities that are constantly evolving and core rigidities with respect to new product or solution development. Innovation does not only have an impact on the change, it also has an impact on the status quo of the organization’s processes and strategies. Leonard-Barton describes the core capabilities as an interrelated and independent knowledge set or system with four dimensions being, employee knowledge and skill sets (being most relevant to core capabilities and new product introduction), technical systems,
managerial systems, and the values and norms of the organization. The Leonard-Barton study shows that innovation projects change the norms and values of the organization. In some cases, the norms and values are altered significantly and at other times very insignificantly. Regardless, the norms and values do change. This modification to the norms and values enables organizational change. The contradiction is that organizations will naturally hold to their core capabilities, yet to be innovative and forward looking, an organization needs to change its norms and values including its core rigidities.

It is also important that organizations are able to tap into innovative ideas that the firm’s customers may not even be aware at this time that they have a need for, or may have a need for in the future. Leonard and Rayport (1997) argue that empathic design, a methodology founded in observations carried out in the customer’s home environment, can tease out those new products and or solutions that customers are willing to pay for, and give the creating organization a competitive advantage in their market. Leonard and Rayport reason that it is the additional information that can be observed when the customers is utilizing the product or solution in their normal physical space that can gain the observer five very key pieces of information. Those five categories are triggers of use, interactions with the user’s environment, user customization, intangible attributes of the product and unarticulated user needs. Triggers of use give the observer the ability to understand what stimulates a customer to be attracted to the organization’s product or solutions. Interactions with the user’s environment give the observing organization the insight into how the product or solution conforms to the customer’s systems and routines. The observing organization can observe a customer, as an example using a new software solution, opening and loading new software and determining what issues they run into while trying to install and use the application. Customers that do run into installation issues will normally find their own ways around the problem and never report back to the provider. User customization observes any reinventions the end user may make to the product or solution to meet a unique or specific need that the customer may require. Intangible attributes of the product is seeking to understand any peripheral and or secondary
characteristics and or qualities that the product may necessitate. The intangible attributes of the product, as noted by Leonard and Rayport (1997), are not easily understood or revealed through traditional focus group and surveys. Intangible attributes are more emotional to the end user such as the emotional appeal of a diaper product that could be pulled up by one’s child, giving the parent a sense of their child growing up. In this example, the firm launched a pull up diaper in 1991. By the time competitors were able to reproduce the product, the originator of the innovative pull up diaper were selling $400 million annually. Finally, the last category of empathic design is the unarticulated user need. Unarticulated user need is observing and understanding the problems that the customer may find during the daily routines of the product or solution.

The significance of empathic design is the observation of the customer using a product or solution in its natural environment and not in a research laboratory setting. Through observation, capturing data, reflection and analysis, brainstorming for solutions and developing possible solutions, organizations can not only make their products better, they can push innovation to meet a true need of the user.

From a project management perspective, Turner, Keegan and Crawford (2003) use a learning model for the application of innovation. They argue that within a project based innovative organization, the firm can deliver superior project management maturity by taking the lessons learned of past project activities and codifying them into the holistic project management procedures of the organization. By recording organizational learning, post completion reviews, benchmarking and then distributing these learnings through the organization, the firm can gain a broader range of experiences and drive innovation. Gann and Salter (2000) also argue that “business processes are the intra-organizational activity, forming the glue which binds the different parts of a project-based firm” (Gann & Salter, 2000, p 955). Gann and Salter also point out that project based activities differ from operational organizations that are more stable with their business activities. As organizations become increasingly more complex, they move to a more project based system of operation. There is a limit to the
level of innovation that an organization can expect to continue to make gains. Chen and Huang (2010) contend that as an organization reaches the most advantageous level, there is a parallel increase in the workforce density, being the relative amount of resources in a firm that perform creative activities. This will in turn increase the innovative performance of the organization. Once reached, the firm has arrived at the tipping point of diminishing rate of return on innovation.

Innovation is needed for organizations to maintain their competitive advantage. First to market with a new or novel product or solution translates into increased revenue for the organization. Project-based organizations can employ many tools and techniques to create and maintain innovative practices with the firm such as agile development for project execution, learning organizations and empathic design to maintain a competitive advantage against their rivals.

2.7.6 Knowledge Stickiness

The strength of an organization’s knowledge assets, its effective management of knowledge and its ability to quickly learn are key strategic competencies (Teece, Pisano and Shuen, 1997). Moreover, an organization’s capacity to be innovative and beat rivals to market with innovative products and services is recognized as being a dominant thread in the debate concerning business strategy (Stalk and Hout, 1990; Eisenhardt and Brown, 1998). Thus, it is argued that forward looking organizations manage knowledge and learning to gain a competitive edge from their rivals. It is in this manner that they respond to market challengers, by anticipated demand patterns and positioning products and services that require effective coordination of knowledge and learning.

Knowledge management relates to the creation, transfer, storage and use of knowledge by individuals, groups and organizations (Nonaka, 1991; Davenport and Prusak, 2000). The dominantly held view is that knowledge is refined information with embedded meaning (Davenport and Prusak, 2000); however, Tuomi (1999) argues that through
the process of refining data into information, and then into knowledge, knowledge is in fact initially required to be able to make sense of data and then synthesize it into information. Whichever view one chooses to accept, there can be no doubt that knowledge is vital, and so capitalizing on its merits is pivotal to being competitive. Porter (1985) highlights three kinds of competitive advantage; a cost advantage, a focus advantage and a differentiation advantage, all requiring sound knowledge management and organizational learning capacities. Effective knowledge transfer and use allows firms to be efficient, and hence reduce costs, it also allows better focus on customers through knowing what they could want, and having this knowledge is a vital way for firms to differentiate themselves by offering goods and services in a way that is difficult to imitate.

Organizations recognize and appreciate that knowledge sharing and knowledge management foster better communication, idea sharing and solution resolution. Nevertheless, it can also give the firm a competitive advantage within its existing market segments. The term knowledge has been categorized as being explicit or tacit. Explicit knowledge is the knowledge that can easily be drawn from humans, codified, documented, communicated and placed into a database or groupware for withdrawal at a later time (Nonaka, 1991). Tacit knowledge, as argued by Lam (2000), is intuitive and unarticulated, and is very difficult to communicate. This is particularly true for organizational skills that employees need to learn through practical experiences.

A practical example of explicit knowledge transfer would be giving an employee training and documentation to perform a process such as a product configuration for a client that also links in delivery and installation instructions. The employee is given the tools and knowledge to complete the required tasks. Explicit knowledge is often easy to transfer via training, explanation, and documentation. Nevertheless, the more effective and beneficial value in learning how to perform the process comes from finessing it from the use of tacit knowledge. Tacit knowledge, however, is not expressed directly and is much more difficult to generate, codify, and communicate, making it arduous and challenging to transfer. Polanyi (1997) described tacit
knowledge as being characterized as non-verbalized, intuitive and in-articulated knowledge, where as tacit knowledge can be transferred in part through guided experience. Examples of this approach would be by physically stepping someone through a process and helping that person overcome difficulties or resolve unique situations in the process as they arise. Tacit knowledge is extremely difficult to transfer from one person to another without close and intimate support. However, Von Hippel, Thomke and Sonnack, (1999) illustrate using an example from the 3M corporation that demonstrates how valuable explicit and tacit knowledge can be transferred from using lead users to ideas developers. Von Hippel, Thomke and Sonnack’s (1999) research showed the effect of how the transfer of the rich tacit knowledge lead to greater performance in the employee’s ability to resolve complex problems. The goal is to attain both explicit and tacit knowledge transfer.

A subset of tacit knowledge, self-transcending knowledge, is relevant to the case study context. Scharmer (2001, p.69) described this as knowledge that has yet to develop into tacit knowledge. An example of self-transcending knowledge comes from Michelangelo. When referring to his famous sculpture of David, through sensing the emerging figure, Michelangelo said “David was already in the stone. I just took away everything that was not David”. It is this ability to see David where others see just a rock. In similar ways, skilled case study employees can use self-transcending knowledge to develop new products and faster administrative processes to deliver products and services to markets.
Knowledge transfer has been the subject of intense study for over fifteen years since Nonaka (1991) first published in its Socialization, Externalization, Internalization and Combination (SECI) model about individuals sharing tacit knowledge through socialization, and as this tacit knowledge is explained, it becomes externalized into explicit knowledge that through being combined with existing explicit knowledge, becomes internalized by the individual and framed again as the person’s tacit knowledge (Nonaka, 1991). This way of looking at knowledge generation and use sees both data and knowledge as being inert and actively refined as depicted in Figure 2.10.
These ideas were extended to the way that groups and organizations use knowledge as stocks and flows of knowledge are fed forward with feedback loops as described by Crossan, Lane and White (1999), which offers a model described as the ‘4 Is’ (intuiting, interpreting, integrating and institutionalising) as seen in Table 2.4.

Figure 2.11 - Learning by doing (Nonaka, and Takeuchi, 1995, p.71).
Table 2.8 - 4I’s (Crossan, Lane and White, 1999, p.525)

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<th>Level</th>
<th>Processes</th>
<th>Inputs/outputs</th>
<th>Comments</th>
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<td>Images metaphors</td>
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Group

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<th>Shared understanding</th>
<th>Culture providing means to interpret and share insights – internal knowledge building push and pull</th>
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<td>Mutual adjustment</td>
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Organization

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<th>Routines</th>
<th>Culture and combination re-framing and adapting</th>
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<td>Institutionalising</td>
<td>Diagnostic systems</td>
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This is similar to the SECI model. Intuition is tacit knowledge, and this is made explicit through interpreting it relative to its context; the knowledge becomes combined and integrated with the pool of knowledge and this becomes internalized by the organization as a whole. Lawrence, Mauws, Dyck, and Kleysen (2005) add to this model’s notions by considering the role of power in the process to better explain how the dynamics of the process operates. They argue that individuals influence groups, and groups force organizations to internalize knowledge, and once that happens, knowledge becomes institutionalized through culture and governance, and this disciplines groups and individuals. This part of the discussion helps to understand what knowledge is and how it is created and transformed between people, but it does not explain why knowledge exchange is so difficult. The concept of sticky knowledge as developed by Szulanski (1996; 2003), forms a valuable and useful support and testing mechanism for the two research projects that will be described in more detail in a following section of this thesis.
Gabriel Szulanski undertook a research on the stickiness of knowledge and identified seven sources of knowledge stickiness:

1. Source lacks motivation (unwillingness to share knowledge);

2. Source lacks credibility (the source lacks authority, expertise or is perceived as unreliable or untrustworthy);

3. Recipient lacks motivation;

4. Recipient lacks absorptive capacity (does not have the background to perceive cause and effect links, lacks underpinning knowledge or experience in experimentation to know how to use the knowledge);

5. Recipient lacks retentive capacity (forgets vital details);

6. Barren organizational context (the culture or governance structure inhibits knowledge sharing);

7. Arduous relationship between source and recipient (lack of empathy, trust or commitment to collaborate in the task of sharing knowledge as illustrated in Section 2.7.3).

Szulanski (1996) concluded from testing his model (canonical correlation analysis of a data set consisting of 271 observations of 122 best practice transfers in eight companies) that contrary to conventional wisdom that blames primarily motivational factors, his findings show major barriers to internal knowledge transfer:

- knowledge-related factors such as the recipient's lack of absorptive capacity;
• casual ambiguity;

• an arduous relationship between the source and the recipient (Szulanski, 1996).

Koskinen and Pihlanto (2006) share insights into the manner that barriers to knowledge and competence transfer rely on the quality of the interpersonal relationships between sources and targets with their conceptual tool the Holistic Concept of Man. This defines the human individual as consisting of three deeply intertwined modes of existence being consciousness, situationality, and corporeality, to briefly summarise their propositions. Since communicability and motivation are often identified, as shown above factors that facilitate or hinder competence transfer, the quality of the interaction environment is critical. They state that newcomers rely mainly on explicit knowledge, while old timers rely on tacit knowledge. Also, to effectively work together in transferring tacit knowledge, it is vital that source and target share at least a fair approximation of the same world view. Cultural understanding is pivotal. They also point out that in the corporeality mode of existence; physical factors play a large role, including the comfort of the situation, physical or psychological. Further, the physical health or comfort at the time of transfer is also important so that distractions of a variety of forms can and do have a strong impact.

Having understood what knowledge is and why it can be sticky, the organization’s next step is to look at the ways that it can successfully transfer knowledge. Prencipe and Tell (2001) provide a useful typology of learning processes that are analyzed at the individual, group and organizational level. The processes are experience accumulation, knowledge articulation and knowledge codification. They categorized organizational approaches to codifying knowledge as being predominantly explorers, navigators or exploiters. Explorers focus on experience accumulation processes across individuals, groups, projects and organizations. They articulate and codify knowledge mainly at an individual level. Navigators focus on knowledge articulation processes with individual
learning processes, with an emphasis and some lesser emphasis on group project knowledge codification processes. Exploiters focus on individual experience accumulation, knowledge articulation and knowledge codification learning processes (Prencipe and Tell, 2001). They focus on knowledge articulation at both the individual and group project level. They also focus on knowledge codification at all three levels. Resolving or adjudicating a complex problem from a knowledge transfer perspective can also involve the continuous examination and reflection back to the original model or template to make comparisons with the new model (Nelson and Winter, as quoted in Szulanski, 1999). This may also include many exchanges of information between the sender and the receiver in an attempt to ensure sound understanding and knowledge exchange.

2.7.7 Knowledge Transfer

Within the knowledge management domain there is the specific activity of knowledge transfer. More importantly, and specific to this thesis, is the ability to transfer knowledge and individual experiences successfully between individuals, groups, and departments within an organization. Specifically, knowledge transfer is about those activities such as organizing, creating, revealing and disseminating knowledge from one individual to another, from one team to another, and from one department to another. As with knowledge management, knowledge transfer, when done successfully, gives a firm a competitive advantage (Argote and Ingram, 2000). Argote and Ingram (2000) maintain that knowledge transfer is a difficult activity to carry out successfully within an organization with knowledge residing in multiple repositories and locations. Zhao and Anand (2009) argue that knowledge transfer requires a sender or teacher and a receiver or learner. With respect to teaching, there is an absence of research in the management field. Zhao and Anand (2009) also maintain that job related knowledge is context constructed and is difficult to see or bring into play. This knowledge is only exposed in specific circumstances. For example, the individual is best to learn and retain knowledge if he or she is immersed in the work community where the knowledge is to be learned, used and retained. An illustration would be if an
individual was attempting to learn a new language, the most effective context to learn the new skill would be within the country where the language is spoken, versus learning in a sterile classroom. From a teaching perspective, there is individual teaching as well as collective teaching. Individual teaching is undertaken by an individual such as a lecture or training. In cases within an organization, there is collective teaching where members of the organization undertake knowledge and routines of the firm to the receiving group. Davenport and Prusak (1998) state directly that knowledge is transferred within all organizations whether it is managed or not and is a normal activity in organizations, although local and fragmented. The culture of the organization can also be an inhibitor or enabler to knowledge transfer. Inhibitors include a lack of trust, differences in culture, lack of time, and intolerance for mistakes and unwillingness to ask for help. Enablers include human resources practices, organizational structure and culture (Donoghue, Harris and Weitzman, 1999). Evaluation and performance reviews that promote knowledge exchange and provide time for employees to exchange knowledge in a nonabrasive environment encourage the exchange of knowledge. Syed-Ikhsan and Rowland (2004) additionally contend that technologies such as information and communication technology are successful facilitators to knowledge transfer. Knowledge transfer is a constant activity within an organization, and those firms that proactively manage, organize, create, and disseminate knowledge from one individual to another have a competitive advantage versus firms that do not involve themselves with these activities. The practice is to encourage, manage and most importantly, to transfer knowledge effectively and successfully.

2.7.8 Knowledge Transfer Environments

The importance of environmental comfort is an essential consideration in designing a workplace layout and facilities to motivate learning and successful knowledge exchange. Receivers of information in a physical environment that is well designed learn better. In a poorly considered environment, the receivers are distracted and the successful transfer of knowledge is reduced (Knirk, 1987; Gifford, 1976). The learning
environment surroundings should include comfortable chairs and tables free from placing knowledge recipients under stress and distraction. Emmons and Wilkinson (2001) argue that interaction between receiver and sender are most successful when a student and a teacher can interact unencumbered with each other. Nye (1991) argues that the layout of the learning environment should not be in the traditional proscenium layout with the instructor standing at the front of the room with all of the tables and chairs lined up in neat rows for the receivers of information. Rather, the ideal configuration is elliptical, where the receiver’s workspace is on the perimeter of the facility, or in pod configurations so that both the instructor and the receivers can move about without restrictions. Gifford (1976) contends that if receivers are compacted too closely together, they will accept an awkward or uncomfortable seating arrangement and will accept the impediment for up to 90 minutes, distracting them from accepting the instructions. Cheng (1994) maintains that the learning environment that is made up of the facilities, space, lighting, ventilation, chairs and desks directly impact the receivers learning attitudes and behaviors. “Glare, noise, light modulation, and room temperature can positively or negatively affect learning” (Emmons and Wilkinson, 2001 p. 80). Environments require lighting levels that are sufficient and adjustable. Ambient temperatures need to be between 20 and 24 degrees Celsius. Workstations, including desks, and chairs, need to be ergonomically correct and the user has the ability to adjust the furniture for themselves (Emmons and Wilkinson, 2001). Cheng’s studies show that the learning environment needs to be free of pollution, such as being clean with neat desks, workspaces and the general environment. As well, there needs to be enough space for the students to do their work without being constrained by space. The importance of the environment does impact receiver performance to successfully receive information.

2.7.9 Community of Practice

Organizations of the twenty-first century have a myriad of configurations of teams, focus groups, cross-functional teams and working teams, as well as Communities of Practice (CoP). Wenger and Snyder (2000, p139) characterizes a CoP as “groups of
people informally bound together by shared expertise and passion for a joint enterprise”. The members of a CoP have a common interest, such as project management or business analysis management, and come together informally. The CoP does not necessarily need a preconceived agenda or schedule and can meet in any location that is conducive to the exchange of information and knowledge on the topic of their interest from within the organization, to a location external to the firm, for example in a restaurant or bar. CoPs can solve problems, drive innovation, transfer best practices, exchange knowledge, develop professional skills, drive strategy and recruit and retain resources. Brown and Duguid (1991) argue that CoPs are significant sites for innovation in particular. As well, they note that individual CoPs can evolve into a community of communities that can bridge the gap between work, learning and innovating. O'Donnell, Porter, McGuire, Garavan, Heffernan, and Cleary (2003) argue that intellectual capital creation is produced within a CoP. The CoP is an interest based and interest driven community and not the formal creation of the management of an organization. There is a difference between a formal team within a firm and a CoP. Formal teams are defined by management and are tasked with specific deliverables such as completing a project. A CoP is a loosely held group of people driven by a common interest or topic that provides value to the members. It is within a CoP where members share knowledge, learn, problem solve and create new intellectual capital. O'Donnell, et al. (2003) also argue that it is communicative action, being the interaction between two or more subjects, that is at the core of intellectual capital that is produced within a CoP.

2.7.10 Knowledge Management in the Project Domain

Projects bring together project team members that carry with them many diverse and eclectic knowledge backgrounds. Their backgrounds, training and experiences are varied from working on many different projects with different people, and in some cases, with many separate organizations and industries, as well as disciplines within those organizations. Another factor is that the project team members may come with varying levels of skills and competencies from an expert in the field to a new employee.
with limited skills and experience. As illustrated by Love, Fong and Irani (2005), this is an opportunity for the positive exchange of knowledge from the expert to the novice. Along with specific professional and technical skills, project team members also know and understand the project management methodologies, processes and expectations of the project manager and stakeholders. Specific to project team members is that team member disciplines may be so diverse that they have their own knowledge base and language, which can make the transfer of knowledge difficult (Love, et al. 2005). Engineering and marketing resources have different views of the same problem, different ways to solve them and separate languages to speak of them. The project environment brings team members together with different backgrounds, skill levels, education and experiences, to solve the project problem or opportunity.

As outlined by Morris and Pinto (2004), project-focused organizations, versus an operational-focused organization, are dissimilar with respect to knowledge management and knowledge transfer. Projects are concerned in creative actions and translating a new idea into action versus pre-planned, process heavy actions exercised in an operations environment. Project environments are diverse, ambiguous and unstable, while an operations environment is recursive, stable and secure. These differences have an influence on how knowledge management is implemented. The project environment is a learning environment and a place where knowledge is created and transmitted between the project members and stakeholders. Without the successful implementation of knowledge management within a project environment, the project would struggle to be successful. Jewels and Ford (2006) agree that it is the motivation of knowledge workers that are considered an essential success factor for the knowledge management implantation. From a project perspective, Jewels and Ford (2006) argue that an enabler for the transfer of knowledge is to align the goals and objectives of the project, as well as the vision of the organization. This gives the team the opportunity to approach the issue from multiple perspectives based on their competencies and experiences. Knowledge management is a fundamental part of project management and project implementation. Projects are different within an operational organization, and project team members need to bring to the project environment their skills,
competencies, and experiences and be willing and able to transfer this information successfully to other team members to have a positive impact on the project.

2.7.11 Knowledge Advantage

The knowledge advantage is utilized to unleash creativity and innovation, and to create a competitive advantage for an organization by exploiting the firm’s knowledge, and by managing that knowledge effectively. This knowledge advantage, as coined by Walker, is based on three main pillars; the Information and Communications Technologies (ICT) infrastructure, leadership, and people infrastructure (Walker, 2004). The people infrastructure of the three pillars is the foundation that delivers a knowledge advantage with the information and communication and technologies infrastructure supporting people infrastructure. Figure 2.12 depicts the knowledge advantage model.
Each of the three pillars is then broken down into subsections. The information and communications technologies decompose into the ICT hardware and software infrastructure that includes such things as networks and portals. Leadership decomposes into envisioning, for example, articulating a vision and the vision’s options and issues. The second decomposition is the vision realisation which is the planning, mobilizing, deploying and maintaining of the vision. The third pillar breaks into the social capital, being trust and commitment, knowledge creation, sharing, and transfer. The process capital includes the reward systems, learning and knowledge sharing processes. This model represents the characteristics of the organizations knowledge advantage.

2.8 Communication and Communications Problems

With respect to communications and communications systems, there have been a number of psychological studies conducted. Miller (1956) summarized a number of
studies on showing that there is a limit on the amount of information that humans can receive, process and retain. Miller’s study looked at ways to increase the amount of input information and then the amount of that transmitted information that is recoverable by the person. Miller believed that as one increases the volume of information being input to the receiver of the communication, the output would contain more and more errors. The point of saturation was called the channel capacity and is generally five to seven bits of information that can be differentiated and identified. The experiments placed humans in a position to listen to a one dimensional tone frequency, and the listener then gave the tone a ranking number to identify the tone numerically. Above five tones, the listener became confused and committed a number of errors. Miller also found that if the sender could transmit the information into a sequence of chunks, there was an increase to the listener’s capability. As information moves from one dimensional to multi-dimensional, there is a marked increase in successfully transmitted information that is recoverable. As an example, humans can easily identify hundreds of faces and thousands of distinct objects effortlessly and accurately. Faces and objects have multi dimensions that have many attributes that differ from each other versus a single one dimensional tone.

Information overload within organizations causes a number of issues such as an increase in stress for employees, as well as reduction in quality decision making (O’Reilly, 1980). The amount of information that is generated by organizations far outpaces the capacity for their employees to process the information (Farhoomand and Drury, 2002). O’Reilly (1980) argues that large amounts of irrelevant information that is presented to employees via email, the internet and extranets firstly reduces the ability to identify pertinent information that secondly causes a decrease in the quality of decision making. Employees are inclined to seek out more information than they actually need, which causes an overload of information. Employees will seek out this overload of information to satisfy their need for confidence in their decision making. In fact, it causes a decrease in their performance. Hahn, Lawson and Lee (1992) also contend that it is not only overload that negatively impacts decision making it is also the amount of time the resources have to make the decision. Hahn, Lawson and Lee
(1992) argue that information overload is influenced by time pressures. If employees are not rushed to make a decision, the quality of their decision will improve with an increase of additional attributes surrounding the decision. If an employee is time constrained, the quality of their decision making drops as the information load is increased. Huber (1991) argues that information interpretation is less effective if the information goes beyond the capacity for the person to process the information effectively. When an employee is given an excess of information, and they do not have the capacity to adequately analyze all of the information, they do a poor job of interpreting, versus if they were to be given a smaller amount of critical information. These psychological studies give insight to overload within organizations and the limits to the amount of information that humans can receive, interpret and make high-quality decisions.

Twenge and Campbell (2008) examined data from a number of cross temporal meta-analysis studies to understand the differences in the psychological traits and attitudes within the different generations of workers moving into the workforce. The research shows that change in culture occurs gradually over time, and not abrupt or unexpected generational shifts in traits and attitudes. One of the significant changes that the study found was that Generation Me workers that are entering the workforce, born in the late 80’s and early 90’s, tend to be technically savvy with respect to smartphones, text messaging, instant messaging and various other distractions. As outlined in Section 6.2 these destructive distractions have a profound impact on knowledge transfer.

2.9 Acronyms

An acronym is a word organized from the initial letters of the words in the name such as Business Analyst (BA). Once the receiver can make this correlation, the acronym BA now gives the receiver the meaning of the letters. The difficulty begins when, for whatever reason, the receiver does not know the correct definition of the acronym. Below is an example of a sentence that was extracted from a journal from Wolf (1999):
The reason is that most people active in the IEFT expect ATM to be solely a WAN solution, and maybe the WAN solution presenting the backbone of a future Internet, but ATM will never make it to the desktop in their view.

If the receiver is not aware of the meaning or context of the acronyms, the sentence becomes:

The reason is that most people active in the ***** expect ***** to be solely a ***** solution, and maybe the ***** solution presenting the backbone of a future Internet, but ***** will never make it to the desktop in their view.

This exchange of knowledge is virtually useless to the receiver of the information and is discussed in detail in Section 6.2.2.

2.10 Chapter Summary

This chapter has introduced to the reader a number of project disciplines and processes with a focus on the various life cycles, project requirements and knowledge management within the project management domain. The chapter opens with a review of the CHAOS study, which demonstrates that software project implementation in the U.S. was, for a number of critical reasons, in disarray. This chapter reconsiders, through the literature review, what this thesis is exploring, and most significantly, explains how the thesis will develop the understanding and augment the effectiveness of knowledge transfer that occurs related to the systems development and project management processes within a highly dynamic and intensively active work team.

Along with a number of generic project life cycles, the chapter discusses the waterfall life cycle being a development process with a linear series of steps and tasks, where the first tasks must be completed before the second. There is discussion surrounding the...
Six Sigma model that is used to improve business processes to generate improved financial results of organizations. The Unified Process Life Cycle Model is explained that it is based on Agile S/W methodologies using a four phased interactive approach as well as the Adaptive S/W development life cycle that is focused on managing changing requirements during the life of the project. As well, the chapter discusses the systems development life cycle and the PMBOK®/PMI® life cycle. This section concludes with a comparison of the different life cycles.

The chapter also explains project requirements that come in two central categories being functional requirements and non-functional requirements, and explains the Software Engineering Institute – Requirements Taxonomy giving the reader an understanding of project requirements, and their role in the project management processes. The chapter concludes with an explanation on types of knowledge, motivation, trust and commitment, knowledge management, what can be considered sticky knowledge, knowledge transfer and the significance of knowledge management, specifically in the project domain.
Chapter 3 - Research Method and Design

3.0 Introduction
This chapter is used to account for and justify the research method and design to address the research questions stated as:

- What drives poor business requirements production that negatively impacts projects in the implementation phase?

- How does the removal of the barriers to knowledge transfer ensure the customer requirements meet customer expectations?

The chapter explores the ontology and epistemological methods of attaining knowledge. It then moves to the research purpose, with an explanation of the study question, proposition, unit of analysis, the logic link between the data and the proposition, and ends with an interpretation of the findings. This chapter also reviews the action research methodology in detail and then discusses the selecting of a testing method that is used for this research identifying barriers to successfully transferring knowledge in a business setting, specifically from customers, end users and the project team members. The chapter explores the enablers to successfully transferring knowledge and ends with the structure and design of the research and the data collection.

3.1 Ontology and Epistemological Overview
The origins of the problem statement for this thesis, and the resulting research, comes from the author’s reflection on 25 plus years of experience in the project management and systems development environments, from both a large organization of more than 30,000 employees, to a small US high-tech start-up firm with less than 30 employees.
Experiences include process improvement projects, change management, human resourcing, software projects and program management. The author’s observations within both a project and systems development environment, and the related requirements management have given the author unique insights to the unsuccessful transfer of requirements from person to person, team to team, and department to department. I believe that there needs to be a more universal or common pattern or similarities to the reasons behind the inadequate transfer of requirements content. After the initial literature review, I concluded that there was insufficient research on the topic of knowledge transfer, from a requirements perspective, from a project management and systems development standpoint, and with respect to the present communications technologies that both enable and are a barrier to knowledge transfer. I did recognize both a need and an opportunity to engage the various project management, systems development and business analyst team members to start this research work.

The research for this thesis was accomplished by means of an iterative process. I believe that it is no longer valid in a professional environment to make use of existing knowledge, based on a single iteration of research. My goal was to have a number of iterations and reflections to ensure a broader reach into the understanding of the topic, therefore an ontological approach was used to start the process by using experience to begin to develop and expand the answer to the problem statement of the thesis. Case studies were used to focus on specific domains that are supported by face-to-face interviews, observations, questionnaires, and my personal involvement in the processes surrounding the thesis.

Both ontology and epistemology have a philosophical and theoretical lineage and grounding (Blaikie, 2000). Ontology is the metaphysical study of the nature of being and existence. As noted by Guarino (1998), in a pure philosophical sense, one can refer to ontology as a system or concepts of classes that account for a certain vision of the world. These systems are considered independent of language used to describe the system. These systems or concepts are also called classes, which describe various features and attributes of the concept. It is these classes that are often the focus of
ontologies (Noy and McGuinness, 2000). Ontology answers questions of the nature of being or reality in general, as well as the systems or concepts associated with them.

Epistemology is the philosophy of knowledge or the concept of knowing, and deals with the question of intellect (Goldman 1986; Morris and Pinto 2004). Epistemology attempts to know and understand the world around us, and defines the world in terms of belief and probability. Epistemology is the study of the nature of knowledge and how we define and recognize knowledge. It is used regularly for the study of organizations and knowledge management.

Therefore my ontological stance for the research within this thesis is founded on my personal experience of more than 25 plus years of management practice. I take a practical and pragmatic view of the world as a practitioner. Starting with the problem statement, being what is it that drives poor business requirements production that negatively impacts projects, with respect to my personal observations and discussions with hundreds of senior managers that have articulated that knowledge transfer was and is done poorly. It is a negative business attribute with a corresponding negative cost to the organizations. I sought to profoundly reflect on this issue and then conduct the various research studies within this thesis. Reflection is founded on tacit knowledge that is well below the surface and difficult to articulate. It was this ability to move this tacit knowledge into action. As described by Schön (2003), from an epistemology perspective, knowing is more than we can say. Given that I think as I do in my profession, to gain the tacit knowledge I was required to move that knowledge into the actions required for the research study. With a goal and problem statement visibly in hand, and after an extensive literature review and interviews with experts in the field for validation and direction. I determined that this would fulfill both the ontological and epistemology viewpoints of having the goal articulated and exploiting past research in my field of study.
3.2 Research Options

During the process of defining the research strategy, there are a number of potential options that are made available to the researcher that, if valid, can be adequately justified. The following section describes the research paradigms, approaches, methodologies and data collection methods that were available and were investigated and examined during the planning of the research strategy.

Figure 3.1 - Qualitative research strategy framework – some options (Source adapted from Nogeste, 2006, p.88)
Heron and Reason describe research paradigms as “the notion of a paradigm or worldview as an overarching framework which organizes our whole approach” (Heron and Reason, 1997, p. 247). Paradigms are a set of beliefs, attitudes and viewpoints regarding the nature of reality as well as how humans can come to know and be aware of them. Positivism, realism, interpretivism and constructivism are four common paradigms, and are used to understand, and be aware of, existing beliefs in the world around us. Positivism is a form of knowledge derived from experience that arose in the nineteenth century to describe science and technology. It is based on knowledge, perceptual practice and understanding, to move away from superstition and pseudoscience (Schön, 2003). Realism, as argued by Stiles (2003), states that people’s understanding of their social environments and the underlying and fundamental structures are impacted by their behavior and knowledge of their situations. Realism uses semi-structured interviews, consultations and group observations, as well as deductive methods. Interpretivism is an approach that is grounded in the study of the nature of being and existence, with the premise that reality is subjective and how people as social actors perceive it (Darke, Shanks, and Broadbent, 1998). This research method is used to understand the experience being explored and acknowledges one’s own subjectivity. The objective of interpretivist research, as stated by Cavana (2001), is to “uncover the socially constructed meaning as it is understood by an individual or group of individuals” (Carvana, 2001, p9). Social constructivism, as described by Gergen, “is principally concerned with explicating the processes by which people come to describe, explain, or otherwise account for the world (including themselves) in which they live” (Gergen, 1985, p 266).

There are two research approaches that will be discussed for this thesis. The first is inductive and the second is deductive. Inductive research, as described by Mintzberg (1979), is detective work that requires the researcher to seek out, find, then understand trends in data. It is then up to the researcher to make a leap from the data to useful theory. The significant word is useful. Goetz and LeCompt (1981) contend that inductive research requires the researcher to not only collect data, it also needs to be
completed through empirical observation and measurements used to flush out and understand relationships between the data.

Quantitative studies use deductive methods and are used to authenticate rather than develop a theory (Creswell, 2003). Deductive methods use data collection, testing and reflection on the theory. As depicted in figure 3.2, the researcher tests a theory, tests the hypothesis or research questions, operationalizes the variables, and measures and scores the variables.

Figure 3.2 - The Deductive approach typically used in quantitative research (Creswell, 2003, p. 125).

The deductive approach sees the researcher introduce the theory immediately after the research question is established. As argued by Strauss and Corbin (1998), deduction is also a form of interpretation that comes from literature and research data in conjunction with the research data the researcher obtains. Interpretation comes from the researchers own assumptions and discussions with colleagues. Deduction recognizes that there is a
human element in the analysis of the data and research being conducted. To eliminate
the potential distortion that can be created, the researcher should use both a deductive
and inductive approach to his or her research.

Ethnography researchers spend extended periods of time in the field seeking out data
(Yin, 2003), with a focus on the details from direct observation. Ethnography is
performed by the researcher in the environment with the subjects of research whether
overtly or covertly (Hammersley and Atkinson, 2007). This research method also uses
questionnaires, surveys, document collection and artifacts, to uncover data in the
natural setting of the research subjects. The focus is generally on a few small cases,
such as a skunk works, to facilitate an in-depth study.

Grounded theory, described by Corbin and Strauss (1990, p.5) “the procedures of
grounded theory are designed to develop a well integrated set of concepts that provide a
thorough theoretical explanation of social phenomena under study.” Data collection are
derived through interviews and observations, as well as written documents such as
books, letters, and emails. The purpose is to pull out credible responses from the
research subjects. Analysis begins at the moment the first data is acquired, and this
initial data is then used to direct future data collection. Grounded theory utilizes in-
depth qualitative interviewing and keeps the researcher close to the data (Holstein and
Gubrium, 2003).

Case study research combines a number of qualitative data collection methods such as
workshops, group meetings, observations and references to existing documentation, and
is particularly applicable to information technology and information systems, as is with
this thesis. Dubé and Paré (2003) outline three important reasons why case research
has gained respect in the field on technology, the first being that information systems in
organizations have moved from the technology being the main focus to the
organization. Second, the case study research allows the researcher to stay up to date
with the continuous changes within the technological fields and gives the researcher the
ability to explore the latest in organizational and technological change. Finally, this is a
holistic investigation that is valid for the field of technology, as information technology and information systems are extremely complex and multifaceted (Dubé and Paré, 2003).

There are a number of valid and robust options for data collection for the researcher to utilize, from meeting with individuals through an interview, meeting with groups through focus groups, workshops and referring to existing documentation. The interview gives the researcher a rich source of data and is a valid starting point for data mining (DeWine, 2001). Once initial interviews are completed, follow-up focused interviews can be conducted to “determine responses of persons exposed to a situation previously analyzed by the investigator” (Merton and Kendall, 1946, p. 541). Focus groups bring a group of research subjects together where each is given the opportunity to share input from their perspective and experience on the topic of discussion (Stringer, 2007). Questions are carefully created by the researcher in advance to ensure focus during the session. The focus group session is facilitated by the researcher who ensures there is order, each subject is able to add their input, ensures the discussion stays on topic and keeps track and records the data through a recording device. Workshops are similar to focus groups, with more interactive activities and brainstorming. The workshop is facilitated by the researcher, and includes not only discussions, but also includes activities and exercises to tease out data for the participants. Finally, documentation for research purposes comes in many forms such as books, journals, newspapers, letters, emails, process documentation, agendas, meeting minutes and recorded personal accounts of activities and experiences. Yin (2003) argues that documentation is a relevant dataset for a case study, as it is stable and can be reviewed and repeated, and contains specific data such as names, dates, references and details of specific events.

The four data collection methods listed above can be used on their own or in tandem, with the goal being to gain access to valid data from the environment and research subjects being investigated.
3.2.1 Research Strategy

The researcher utilized the applied research method to resolve a real world business problem conducted in an objective, accurate and comprehensive way, to complete the investigation (Cavana, 2001). The outcome of this research is to add to the body of knowledge within the project management and systems development discipline, as well as support the very practitioners of the discipline.

The research paradigm chosen for this research is the realist paradigm as highlighted in Figure 3.3. Realism focuses on the social environment and seeks to understand the elementary structures that are impacted by the actor’s behavior. The research was conducted in the real world environment of a business setting in North America, with actual employees of a large firm. Realism also utilizes interviews, consultations and group observations, as well as deductive methods that were used to extract relevant data from the research subjects. The realism model was the most appropriate of the four options, as illustrated in Figure 3.3.
3.2.2 Research Approach

This thesis uses an inductive-deductive model of research using the business model research schema, as illustrated in Figure 3.4, collecting data from a number of sources - surveys and focus groups.
Figure 3.4 - Business model research schema (Lambert, 2006, p.4)
Inductive-deductive model is an iterative approach that has the execution of instructions given a number of times to ensure the same outcome. The author used the inductive-deductive model of research to ensure the validly of the conclusions.

3.2.3 Research Methodology

The research approach chosen was the case study and action research, as these methods of enquiry utilized a small number of cases. Ethnography was not a viable option for this research, as there is not an action element within this methodology. The DPM requires an action factor to the research to fulfill the requisites of the program.

There are a number of proven case study research techniques including explanatory, exploratory and descriptive, that a researcher can utilize for studies. These research strategies will now be briefly examined. The type of research strategies is relevant, and the choice a researcher makes use of is influential to the study. Each has a different means of collecting and examining the data. Many researchers use more than one strategy, for example, the researcher may use an exploratory strategy with surveys and histories for the descriptions phase, and experiments for the causal inquires (Yin, 1994). Figure 3.1 gives the relevant situations for the various strategies. Yin also identifies five components of research design that are important for case studies:

- A study's questions
- Its propositions, if any
- Its unit(s) of analysis
- The logic linking the data to the propositions
- The criteria for interpreting the findings

The study question is asking how and why questions and is the input to the proposition, giving clear focus for the research. The proposition is a statement that affirms or denies something, and is moreover true or false, that can be accepted or rejected. The unit of analysis is the group, organization or location that will be researched. The researcher
must then link the data back to the proposition and interpret the finding that answers the study question as depicted in Figure 3.1.

Figure 3.5 - Components of research design (Yin, 1994 p. 21)

The explanatory case study is a research technique used for complex and multivariate cases where the researchers can use pattern matching methods (Tellis, 1997). The explanatory case study utilizes the five components of research design. The interrelationship of the five components of research design, as described by Seok-Won (2003) noted in Figure 3.2, depicts the strong reciprocal relationship.
Phase one of this research is exercised through conducting an unstructured survey to a limited number of subjects. The objective is to gain an overall or global sense of the topic to be studied. The exploratory method can also be conducted via an informal interview. As noted by Walker (2005), this interview can be as informal as a one-on-one interview or conversation with a co-worker, asking him or her questions on a topic and gaining an open and honest understanding. Regardless of how informally or formally the interview is conducted, the interviewer is still required to take notes of the discussion for future reference. The overall goal of the exploratory research is to expose issues and develop limits for later studies. Exploratory research is completed as one of the first steps in the research process and is used to narrow down future research activities.
A descriptive case study is designed to frame questions against a reference point for greater clarity, and define a complete and appropriate description of the situation in study (Yin, 2003). As an example, if a person has a blood pressure of 110 over 65, the researcher would need a valid reference point to understand if this is a normal, healthy blood pressure number or is too low or too high from a baseline blood pressure. Researchers need to find an orientation, such as against a control group, to understand what is considered a normal number or a mean number to measure variance against. In addition the required references, De Vaus (2002) argues that the researchers also require a period of time. This episode of time gives the research context in which to understand the question of research. As in the blood pressure example above, the level of blood pressure can be measured over a period of six months to validate the stability of the numbers.

There are a number of relevant situations for the different research strategies, as presented in Table 4.1 below. Experiments are used for “how” and “why” questions and are structured events with controlled testing and investigation. Surveys answers the “who”, “what”, “where”, “how many” and “how much”. They can be conducted via a written question and answer format or verbal, and are a detailed critical inspections of the research. Archival analysis answers the “who”, “what”, “where”, “how many” and “how much” as with the survey. The difference between the survey and the archival analysis is that the archival analysis is an observational method that sees the researcher examining documents or archives. These archives can be newspapers, magazines, books and even to the micro level of personal diaries (Psychology Glossary, 2009). History answers the “how” and “why” questions from past data. This preferred method for history deals with questions with operational links that can be tracked over time (Yin, 1994). History lets the researcher look into the past to predict the future. Case studies are utilized to validate a theory and answer “how” and “why” questions. In addition, they can be used to dispute the theory depending on the final results. The researcher can use one or many of these research strategies, depending on the questions he or she is trying to answer, and what potential data may be available today or in the past.
Table 3.1 - Relevant situations for different research strategies (Yin, 1994, p.5)

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Research question</th>
<th>Requires control of behavioural event</th>
<th>Focus on contemporary events</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experiment</td>
<td>How, why?</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Survey</td>
<td>Who, what, where, how many, how much</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Archival analysis</td>
<td>Who, what, where, how many, how much</td>
<td>No</td>
<td>Yes/No</td>
</tr>
<tr>
<td>History</td>
<td>How, why?</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Case Study</td>
<td>How, why?</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>

With regard to the different research strategies discussed above; there are two dimensions of research that need to be considered, cross-sectional and longitudinal. A cross-sectional study is research using a specific point in time, or a research of one large sample, using survey strategies or interviews completed in a concise period of time. Longitudinal studies are used for research that is extrapolated over a period of time by repeating the research observation over a lengthy period of time (Saunders, Lewis and Thornhill, 2003).

Action research is also an investigational method of choice with respect to research within many professional organizations such as the telecommunications industry. In this research case many experts in the field gather business requirements, system requirements and project management expertise. This is a case where the action researcher facilitator is an employee within the firm and a Senior Project Lead. Coghlan (2001) describes AR as a change experiment on a real problem and involves re-education, and challenges the status quo as part of the outcome. The LPMT project team is an ideal fit for this style of research, as they have been segregated from the larger organization for this very purpose thinking outside of the box, being innovative and acutely accustomed to change. Coghlan also comments on understanding
prerequisites that the research team is required to possess. Pre-understanding is the knowledge that the research team has of the existing organization, the cultural dynamics, the formal and informal networks, processes and the general needs of the business. Fundamental to the LPMT is the understanding of the technical jargon associated with the evolving Internet Protocol (IP) network products, for enterprise telecommunications customers. It is also important that the facilitator of the AR ensures that he or she in fact probes deeply into the problem questions and does not assume that the facilitator or the team have the right answer. Rigorous introspection will be required through all of the cycles and phases of the AR process if these are to be successful.

The AR steps taken are summarised below.

**AR steps:**

**Plan of action**

- Research relevant existing literature
- Design and document research strategy
- Design and document research project
- Describe the issue being diagnosed (uncovering of business requirements)
- Determine the causes and the series of actions advancing the principle or tending toward a particular end
- Document changes to existing base lined process
- Test hypothesis strategy

**Take action**

- List/document stakeholders
- Implement changes into real world project
- Facilitation of Destructive Distractions (DD)
• Document impacts
• Document and assess changes to people
• Review outcomes

Evaluating action

• Document meta learning
• Document how the team responded to the changes (individual, team and organizational impacts)
• Evaluate the success of the project correlated to the changes to cost, time, benefits and scope

Once this first interaction was completed, evaluated and documented, this became the input into the second iteration. Again, the AR process was conducted and documented fully.

3.2.4 Data Collection Method

The data collection for this research was a combination of meeting with actual project team members, focus groups and reference to internal documents within the environment as illustrated in Figure 3.3. Focus group sessions were facilitated by the author, recorded and documented for future review and analysis. All questions in the focus group were open and neutral in nature. Participants were also required to sign a consent form, explained at the beginning of the session. They were also encouraged to reflect on the issues and then elaborate on their responses. The sessions were conducted in a non-combative and non-argumentative environment. As an active participant greater and more reliable access was gained to insights and tacit knowledge about the processes as recommended by Coughlan (2001).
3.3 Research Questions and Objectives

The research proposition for this thesis is to assist project team members that are involved with transferring customer requirements from person to person and group to group without the distortion and or loss of content. Improving the transfer of requirement content will have a positive impact on the overall success of a project and the positive acceptance from the customer or end user. A number of themes were researched as noted in Table 3.2.

Table 3.2 - Relevant situations for different research strategies

<table>
<thead>
<tr>
<th>Questions and Objectives 1</th>
<th>Chapter 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Theme</td>
<td>Influence that senior managers have or have not on training programs</td>
</tr>
<tr>
<td>Research method</td>
<td>Survey</td>
</tr>
<tr>
<td>Objective</td>
<td>Identify the influence senior managers have on training and knowledge transfer</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Questions and Objectives 2</th>
<th>Chapter 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Theme</td>
<td>Problems/opportunities for project success</td>
</tr>
<tr>
<td>Research method</td>
<td>Focus group</td>
</tr>
<tr>
<td>Objective</td>
<td>Barriers and enablers to project success</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Questions and Objectives 3</th>
<th>Chapter 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Theme</td>
<td>Transferring both explicit and tacit knowledge</td>
</tr>
<tr>
<td>Research method</td>
<td>Focus group</td>
</tr>
<tr>
<td>Objective</td>
<td>Identify the barriers and enablers of knowledge transfer</td>
</tr>
</tbody>
</table>

The research themes listed above support the ‘what drives poor business requirements production that negatively impacts project outcomes in the implementation phase that result in negative impacts to the overall project?’ research question for the themes:
1. Influence that senior manager have or have not on training programs
2. Problems and opportunities for project success
3. Transferring both explicit and tacit knowledge

### 3.3.1 Development of Research Questions and Objectives

The following research objectives and goals were developed from the preceding research questions.

1. Identify the influence that senior managers have with respect to positively or negatively impacting both employee training sessions and the positive or negative impacts of knowledge transfer

2. Identifying the barriers and enablers of project success, as well as the methods to achieving final product or solution success

3. Reducing the barriers to knowledge transfer and supporting the enablers to knowledge transfer

### 3.4 Research Design

During the commencement of the DPM program, after completing the mandatory coursework, the problem statement appeared crystallized, and free from all uncertainty or ambiguity. After exploring the many research methods, it seemed appropriate for this research to be anchored into an AR approach by centering on a live case study that provided context and explanation power while allowing understanding that lived reality through the AR part of the study. The case study method is concerned with the study of events, occurrences, observable facts and trends in a real life context, and a real life environment. Case studies are used to answer the how and why questions of a study (Yin, 1994).
The focus of this research is to identify barriers to successfully transfer knowledge in a business setting, specifically from customers and or end users to the project team members. These barriers to successfully transferring knowledge can also be found between various departments within an organization and between organizations. Therefore, the design and structure for this research topic is a combination of description and exploration. The research also exploits a cross-sectional time dimension and inductive reasoning methodology. The researcher’s primary method of data collection and analysis is qualitative using both structured and formal focus group sessions, as well as questionnaires and observations. The observation comes from the author who was part of a number of teams where the research was conducted.

The research was completed in two phases:

Phase 1 – an in-depth review of the literature surrounding the systems development and PMBOK® processes as well as a review of knowledge management and knowledge transfer.

Phase 2 – the creation and completion of a questionnaire, and using this methodology to link the theoretical issues with the data being collected. The questionnaire was designed to resolve the impact that senior managers have on training and knowledge transfer. Two focus groups were conducted to resolve the barriers and enablers to project success. One focus group was on communications and knowledge transfer and the second focus group concentrated specifically on knowledge transfer.

The descriptive and exploratory approach of the research design was applied to both phase 1 and phase 2, and drew on the data from existing literature, as well as the output from the survey questionnaire and first focus group, to understand the significance of the senior manager’s impacts. The focus group was concerned with data with respect to the barriers to project success. This first questionnaire and focus group, which were completed in a business environment, gave the researcher relevant information to
understand what is happening here and data to interpret and explain the “how” and “why” question. Upon reflection of the analysis, the researcher planned for the next focus group, and these data were the source for more specific focus groups to capture the barriers and enablers to knowledge transfer. This cycle of look, think, act is aligned with the action research methodology that is used for both a collaborative approach and for complex problems in a real world environment. This research used an iterative approach to continually refine the problem statement down to tangible results that could be addressed directly by the knowledge management model.

3.5 Structure of the Research

Figure 4.3 illustrates the structure of the research, the information and details, as well as the interactions of the various phases exercised for this research.
In-depth literature review of current systems development and project management methodologies

Identify relationships between systems development and project management methodologies and process and knowledge management and knowledge transfer

Initial methodology of the knowledge management overlay model

Formation of questionnaire and focus group

Conduct questionnaire on influence of senior managers

Conduct focus group on barriers and enablers to project success

Refine methodology of the knowledge management overlay model – iteration 1

Observation and reflection

Conduct focus group on barriers and enablers to project success

Refine methodology of the knowledge management overlay model – iteration 2

Observation and reflection

Close out interviews

Analyze all data

Refine methodology of the knowledge management overlay model – iteration 2

Complete knowledge management overlay model

Figure 3.7 - Structure of research
The in-depth literature review, as well as the personal experience of the author was used to create the initial questionnaire and source an initiating focus group. The initial knowledge management overlay model was conceived at a high-level and later refined after the first series of questionnaires and the first focus group session. Upon completion of the first series of questionnaires and focus group activity, there was a review and iteration of the literature review that included additional research on the author’s part to continue to converge on the problem statement. The second focus group task was a refining session, utilizing the past research and reflection, literature review and lessons learned, to distinctly understand the barriers and enablers to knowledge transfer. The reflection period gave the author the time to step back from using experience and to understand what the experience meant and the link between the real and tangible experience and the interpretation of the experience. The next step was to examine and analyze the additional data, reflect and link to the literature reviews and refine the model with the new data.

3.5.1 Phase 1 of Research

The literature search for this research was the underpinning of the thesis. This phase of the research established the linkages between the various project management and systems design methodologies and the relationship to project requirements, and the need for clear knowledge transmission. This also supported the need for an additional refined focus group to continue to develop and improve the model. The final output of the phase 1 literature review was input into phase 2 of the research.

3.5.2 Phase 2 of Research

The phase 2 literature review was completed after extensive observation and reflection. The DPM places a strong emphasis on reflection, gaining the true deep understanding of the issues the thesis is exploring, as well as the surrounding environment. This second review was completed after the refinement of the model to continue to focus the knowledge management model directly at the barriers and enablers to knowledge
transfer. The barriers and enablers of knowledge transfer had come to the surface in the course of the iterations of the research, and were addressed by the model through the dilution of the metadata into more detailed understanding. It was through this conceptualization that the relevant hypothesis and concepts could be formulated into a valid conclusion.

3.5.3 Output of Research

The output of the thesis is a comprehensive knowledge management overly model that is to be used by the practitioners of both the project management and the business analysis domain. The model can also be extrapolated to a number of other disciplines such as change management, facilitation and instructional domain to name but a few. As noted in Section 1.9, the aim of this thesis is to apply an orderly, logical, and consistent knowledge transfer methodology to ensure the consistent transfer of knowledge from one entity to another.

The outcomes from this research are:

- A consistent knowledge flow from one entity to another.

- Improved project success as defined by scope, quality, time, cost, metrics and benefits.

- A conceptual model and theory for knowledge transfer that can be overlaid into the project management and systems analysis environment.

3.5.4 Data Collection – Phase 3

Phase 3 employed a questionnaire and focus groups as the foundation of the data collection. The focus groups had been successful within the working environment where the research participants had spent their lifetimes working in the field of study. Focus
group outputs were facilitated and recorded for later study. All data collected were documented, and this collection of facts and information from which conclusions could be drawn were then used during the reflection period to link reflection outcome to refine the model. The first focus group delved into the impacts of management with respect to motivation and trust on employees. The second was a survey to understand the reasons for project success or failure. This validated the significance of project requirements and the need for an improvement to knowledge creation, problem solving and knowledge transfer. The third focus group session was concentrated on the barriers and enablers of knowledge transfer. The final iteration was a validation of the results that was completed through a survey of independent practicing project management practitioners. This survey was completed to assess and highlight how workable the model may be in a real life environment, as well as highlight any assumptions there may be for it to be functional and add value to an organization. This established the model explicitly as a consequence of exposing the model to this expert validation group.

3.5.5 Validation

The data that were extracted thought the questionnaires and focus groups were validated and tested through the presentation of the research output back to the research participants for their comment, reactions and refinement.

The results of the final thesis findings, once practical saturation\(^7\) of new input was achieved, were also presented to a number of practicing senior project managers for their evaluation and comments. This expert panel was used for validation from a real world working environment and the practicality of the model to this environment. It is also important to bear in mind that the knowledge management overlay model was being introduced into a practical setting contained by an organization within North America, and is used by the author for training, lecturing and requirements management.

\(^7\) The project was live and so it was impractical to keep iterating this indefinitely and also each iteration generates diminishing returns on effort expended so a point arrives where additional iteration is either not feasible due to the commercial realities of the project or else additional improvement becomes marginal.
Table 3.3 - Summary assessment of the quality of the research study (Source adapted from Nogeste, 2006, p.108)

<table>
<thead>
<tr>
<th>Action</th>
<th>Validity</th>
<th>Reliability</th>
<th>Rigour</th>
<th>Workability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research client organizations had mature cultures that encouraged:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- research participants to openly and honestly discuss their feedback</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>in group meetings and workshops (Martinsuo, 2001, p. 544-548)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- research participants interest in learning how to improve project</td>
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<td>Case study reports reviewed and accepted by each research client</td>
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<td>Literature review going through a series of iterations in parallel with action research cycles (Dick, 1993, p. 32)</td>
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<td>Positive, interested and active participation of research participants; happy to fulfil their roles in the research – they perceived the research to be relevant to their daily work</td>
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<td>Research able to be described using plain business English</td>
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<td>Common case characteristics – all private sector projects, including skunk works team</td>
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### 3.6 Ethical Considerations

Human research is described as researching human activities using just tools as surveys, interviews or focus groups to gather information. All research conducted for this thesis was completed within the governance guidelines set out by the Royal Melbourne Institute of Technology (RMIT) University. The application for ethics approval of research involving human participants was completed and approved before the research was initiated (see Appendix D). This research was considered a risk level two, which is considered low risk. All names of participants, their organizations, department and collateral information were changed to protect their anonymity. Respondents from the research, in most cases, were described as representative of special characteristics at a group level and not on an individual level. It was of the highest priority of the researcher to ensure, without uncertainty, the state of being anonymous, in order that the research subjects were protected. Finally, the participants were also given a debrief letter, as illustrated in Appendix E.
3.7 Chapter Summary

This chapter has described the research methodology, design and structure for the research. The first section gives an ontology and epistemological overview as a ground point. The chapter provides details of the research purpose and the components of the research design. The research questions, objectives and rationalizations, as well as the structure and phases of the research used for the case study and questionnaires through a discussion on the research strategy, approach, methodology and data collection method have been illustrated and outlined in the chapter. The chapter then discusses the research options and purpose, such as the successful transferring of customer requirements from person to person and group to group, without the distortion and or loss of content. The chapter ends, by illustrating the validation and ethical concerns.
Chapter 4 - Discussion of Factors That Positively Influence Knowledge Transfer Based on Phase 1 Results

4.0 Introduction

Chapter four is structured to illustrate the impact of leadership and leadership behaviours such as task-oriented behaviour, relations-oriented behaviour, participative leadership, transformational leadership and resonant leadership on the successful, or the unsuccessful or ineffective, attempt of knowledge transfer in a business setting, and to illustrate the linkages between team leaders and members. The chapter opens with an explanation of motivation and leadership from a number of perspectives. Employees need to exercise both their own motivation as well as be motivated by senior levels of management to both learn and transfer knowledge and to develop a culture of learning. This chapter discusses a valid instance of a favourable implementation of a training program within a large organization, which leveraged the strength and motivation of senior management. The chapter also reviews the results of a focus group, and the output of that data was used to examine the problems and opportunities that impact project success.

This chapter then moves to discuss a valid real life example of the successful implementation of a training program into a large organization. It was the support and commitment of the senior management that drove the case study program to success. The chapter concludes with a survey of employees from various industries within North America and their interpretation of how senior management should be involved with training, their impact to the training programs, and what in fact the respondents actually observed their senior management doing today.

4.1 Leadership to Help People’s Want to Change

In Section 2.7.3 the discussion of “sticky knowledge” (Szulanski, 1996) referred to retentive capacity, that is, the need to avoid giving up trying to learn new things and for
reframing new knowledge to become the new status quo. Being open to new knowledge requires being open to change, in more general terms. To be effective, leaders must convince those that they seek to change in some way that the change is necessary, that the need for change is clearly understood and that the change strategy is the correct solution (Grude and Turner, 1996). This implies that at least three transformational leadership skills are required. First, leaders must inspire followers to accept and embrace change which requires a strong and credible vision of the changed state (Christenson and Walker, 2004; Christenson, 2007). Second, that they have outstanding communication skills (Yukl, 1998) and third, they need their followers to trust their judgement so this skill links directly to trust and commitment, as discussed in Section 2.7.2. and also later in Section 4.6 of this chapter.

Motivation to change is also extremely important (Kotter, 1995). Motivation, as described by Maslow (1943), is a hierarchy of needs moving from lower needs to higher needs. “Motivation theory is not synonymous with behaviour theory. The motivations are only one class of determinants of behaviour. While behaviour is almost always motivated, it is also almost always biologically, culturally and situationally determined as well” (Maslow, 1943, p.370). The author argues that within a business environment, employees need both their own motivation as well as the motivation from senior levels of management. This is consistent with the literature on motivation cited in Section 2.7.3. It is the role of senior management to give the purpose and direction for employees to behave, as well as to motivate employees. Motivation comes in many manners and touches all aspects of human life, both personal and impersonal, at home and at work. This section of the thesis focuses upon the motivation of leaders in a business setting, specifically how motivated employees can transfer knowledge and manage the transfer of knowledge in a successful manner, to the advantage of the organization.

Motivation was evident in tapping into job performers’ need for meaning and for purpose as illustrated in this thesis’s case study. Barbuto (2005) links this kind of motivation to a
transformational leadership style and behaviour, as it is the role of senior management to give the purpose and direction for employees that will be the motivating factor for them.

This segment discusses leadership behaviours such as task-oriented, relations-oriented and participative leadership, which can be leveraged to best augment resources in a modern organization. Today’s firms are moving toward a more innovative and autonomous, flat organization, with much less structure and bureaucracy. Seppala (2004) describes a flat organization as one that improves its competitiveness by reducing lead times and focusing on value added activities, and on core processes, versus non-value added bureaucracy in which action is thwarted by the persistence of needless procedures and red tape. Flat organizations can improve employee motivation and commitment to work and focus the employee’s core competencies when the employee’s motivation is to get on with the job with as few barriers as possible. Flat organizations can also place time pressure on supervisors and frontline knowledge workers because of the extra effort needed for coordination that may in turn be a demotivating barrier to being productive, so there is a dual impact happening, and this highlights the need for leadership support of supervisors and front line workers. This in turn requires a bottom-up support philosophy and a bottom-up organizational structure. As with strategic planning, marketing plans, and corporate culture, it is the role of senior management to align all of the activities within the firm, as well as the communications of this information to the employee base. This also includes the role of trainers and the training teams, and the way training and continuous learning will evolve within an organization. It is not the exclusive responsibility of the management, with respect to motivating employees, to embrace continuous learning and the upgrading of skills to meet the changing needs of any modern organization. Through behaviour focused strategies, the very employees themselves can influence their personal motivation and success.

To illustrate and substantiate the importance of providing support for high quality levels of training and support, several valid real-life examples of a successful training program implementation into a large organization are presented. The goal of the following three sub-sections is to demonstrate the link between senior management behaviour and the
successful implementation of a learning environment, and the corresponding successful transfer of knowledge.

4.1.1 Illustrative Example 1 – General Electric at Crotonville

General Electric (GE) leveraged the strength and motivation of senior management including the very highest rating senior manager, the former Chief Executive Office (CEO) Mr. Jack Welch, to support a number of training programs at its Crotonville corporate university. The literature tells us that it was this kind of support and commitment of the senior manager and senior management team that drove early programs at Crotonville to success (Welch and Byrne, 2001) with this approach still used today (Prokesch, 2009).

In his autobiography, Welch explains that with respect to the training programs that he implemented and emphatically promoted these programs for the employee base (Welch and Byrne, 2001), as part of his goal to rebuild GE; Welch focused on training as a core competency of the future of GE and its employees. At the time, GE had a 52-acre training facility in Crotonville, New York, dedicated for training and developing GE managers. For many years, this institution trained basic manager skills, such as profit and loss, marketing, organizational behaviour and general business acumen skills. By the 1980s, the facility had slowly deteriorated, and little training was being conducted. Welch believed that training was the cornerstone for the success of his organization going forward. He hired a former Harvard professor to lead the transformation of the facility and the new training program. Not only did they have the CEO’s full commitment to the training program but also Mr. Welch himself was intimately involved every step of the way to ensure the success of the initiative. He was the driving force, and visible force, behind that regeneration and implementation of the training program.

The new training program within GE was to focus on leadership and strategic development versus functional and tactical training. Mr. Welch required that the Crotonville center be a world class facility, and in doing so, he provided $46 million (US)
for the revamping of the entire center to become a state of the art training facility. His belief was that the returns back to the firm would be “infinite” in his words, and that the returns would “last forever”. As the programs started, Mr. Welch made himself available to speak to the classes and have open discussions on issues within GE with the employees. Not only was he providing direct funding, he was also a strong activist of the program, and he ensured that he was visible to the employee. The curriculum was named Action Learning, and was based on real business issues. The students became consultants, tackling real GE problems during the training sessions. As the program progressed, it was the students that did the actual teaching, and the sessions were facilitated by a professional facilitator versus the traditional lecture style of training. The sessions were exchanges of ideas with open discussion. Crotonville turned into an energy centre that was used to leverage the exchange of new innovative ideas through the successful transfer of new and existing leadership and strategic development knowledge.

The Crotonville training facility, from Mr Welch’s and the participants view, was a complete success. The reason for the success of the program was the motivation and commitment from the CEO to the organization. Without Mr. Welch’s driving force and commitment of monies, the program would never have moved forward. The Crotonville training facility was the catalyst for many more future training related initiatives that would last for years within GE. Full senior management support and commitment was the driving force making the Crotonville training facility an achievement many other organizations have been unable to duplicate. This GE account is an example of a success story that all organizations should consider, if they are sincere in their future success.

4.1.2 Illustrative Example 2 – New United Motor Manufacturing Inc

The New United Motor Manufacturing Inc. (NUMMI) in Fremont, California faced a similar challenge of implementing a Toyota Production System (TPS), a form of lean manufacturing, into a unionized environment. This was a significant change to the way things were normally done, and the impact to the employees was substantial. Waurzyniak (2005) argued that in the NUMMI’s successful TPS implementation was
rooted in the ability of the management’s commitment to the new project. Communications was also a key factor for the success of the TPS transition into the organization. When commitment and communications are accomplished effectively, as in this case, employees can and will embrace change with minimal resistance. With change comes new skills for employees, training, and new opportunities. In this example, the outcome was that the employees became desperate for change. The successful change project within the NUMMI organization from Fremont, California, unfortunately is an exceptional case. Most organizations and their senior management perform poorly when building a firm in terms of what the employees will embrace with respect to changes to their work and process, as well as how they motivate employees to accept and believe in continuous training and a philosophy of lifelong learning. As employees resist change, they are in turn resisting the transfer of knowledge.

4.1.3 Illustrative Example 3 – Program Innovational\textsuperscript{8} – Observation and Analysis

Another example of a pro-training organization is the small team of highly trained employees where the author was employed and worked very closely with over the course of two years. Early in 2003, the planning of a unique program, code named \textit{Innovational} that would see the creation of a number of new Internet Protocol (IP) based product lines, and the corresponding operational process re-engineering. The program was required to address high level strategic and operational planning, mapping of the newly defined operational process, staff and sales training, system upgrades, and the introduction of a number of partnerships with third party service providers. Furthermore, for the program to be successful, employees would need to embrace new ways of thinking, and the ability to successfully communicate and transfer new knowledge. The employees would be dealing with new and innovative products and solution sets that differed considerably from existing services being delivered by the firm. The program attempted to create the processes, and more importantly, the environment to facilitate an atmosphere that would,

\textsuperscript{8} Innovational is a fictitious program name
among other things, include extensive upfront training and the encouragement of knowledge transfer. This team was not only substantially trained from the outset, but there was also a strong emphasis on continuous learning and ongoing in-house training. Training included IP, Six Sigma, and process mapping, as well as gaining the knowledge of the new complex products and solutions. As with the GE training program, the telecommunication firm’s senior managers were also giving employees the motivation, support, monies, and the tools to continue to train themselves on the latest techniques in both technology and management.

4.2 Leadership Behaviours to Motivate Knowledge Transfer

There are a number of well documented and researched leadership behaviours that will be briefly outlined in this section as a foundation for further discussion. According to Yukl (1998), leadership behaviours can be placed into three major categories being task-oriented behaviour, relations-oriented behaviour and participative leadership. Task-oriented managers are focused on planning, scheduling and coordinating the work of job performers. Relations-oriented behaviour supports job performers through assisting in solving problems and leveraging the many ideas that employees may have by transferring this new information to other employees. Finally, the participative leadership style of management is a facilitator of subordinates. Using communications skills to promote cooperation, this style of leadership is used to focus and resolve business issues using all job performers through brainstorming and cause and effect sessions. Bernthal and Wellins (2006) find from an extensive survey of more than 4,500 individuals, from over 900 organizations, that one third of all leaders fail because of a lack of people skills or interpersonal skills. They also found that making tough decisions and executing on projects gives leaders respect in the workplace. They suggest that it was the lack of people skills and their personal issues that caused leaders to fail. If managers cannot transfer knowledge about the purpose, vision and value of a project effectively, then there is a clear gap in their management skills that will in turn hinder the organization. Einarsen, Aasland and Skogstad (2007) noted that tyrannical or authoritarian behaviour is a management tactic used to belittle and manipulate subordinates in order to get tasks and
projects completed. This style of management is not a desired behaviour, and in fact this management style reduces employee motivation and can only be sustained for a short time period, if at all. These are just illustrations of the many leadership styles and attributes that will impact successful change management that senior management can or cannot exhibit.

Noviceive, Harvey, Ronald, and Brown-Radford (2006) argue that during the 1960s, leadership authenticity was researched in length. They claim that authenticity is a social condition of minimal disagreement between the external appearance and the inherent internal structure. They postulated that the leadership of an organization, attributes that the leaders maintain, trickle down and cascade into the organization, and these characteristics are then absorbed and retained into the organization by the employees. They add that if this is not maintained, and there is a moral deterioration of the leadership, the organization in turn will become complacent and disconnected. A powerful example of this is observed in a reported case in Canada in 2003 where the CEO of a major Canadian airline was caught spying on a rival airline, which in turn sparked a $220 million lawsuit (Macklem, 2010). Until the scandal, the CEO was regarded for his drive and business acumen, and the organization successfully competed with much larger airlines. In an attempt to maintain a sense of authenticity and legitimacy, the CEO worked on what he called damage control by publicly apologizing to the rival organization, stating that the action was both unethical and unacceptable (Sorensen, 2006) to protect his and the organization’s authenticity.

Transformational leadership is another variation of a management style that sees the leader inspire and deepen followers resolve to achieve remarkable results, by providing meaning to the employees through the alignment of objectives and goals. Transformational leadership and leaders are those who operate as change agents within an organization. Avolio, Waldman and Yammarino (1991) have argued that organizations are constantly adapting to the changing markets around them. To remain competitive, many organizations are now reducing bureaucracy and the number of management levels within the organization. This change also pressures organizations to
increase the span of control of their management, as well as look for ways to flatten the firm. As argued by Avolio et al (1991), transformational leadership is facilitated by what they refer to as the four I’s:

- Individualised consideration
- Intellectual stimulation
- Inspirational motivation, and
- Idealized influence

Individualised consideration is about dealing with individuals and individual needs as each person in an organization has distinctive wants and desires. The role of a mentor is to be in a position to relate to the individual needs of one person. Leaders in higher positions within the organization can impart symbolic concern of an employee by standing up for an individual. Intellectual stimulation has the leader finding ways for employees to change their existing thinking patterns within an organization by thinking about problems in a new and unique way, or outside the box thinking. Inspirational motivation has been found mostly in the upper levels of the organization, and with the leaders that are motivating and moving employees to action. Inspirational motivation leaders are mostly observed from top managers; nevertheless, all employees can motivate another human. Finally, idealized influence is presented as respect for others and building up other’s confidence in the overall mission of the organization. Transformational leadership and the four Is give leaders the ability, in a constantly changing environment, to develop, motivate, encourage and arouse employees, and it is a crucial component for the leaders to be successful with respect to positively influencing employees (Avolio, et al, 1991).

Another theory on how leaders can influence employees’ attitudes, behaviours and performance is authentic leadership as proposed by Avolio, Gardner, Walumbwa, Luthans and May (2004). As argued by Avolio, et al (2004), humans have core values and identities, and they are consistent with these beliefs. The more strength the person has in his or her beliefs, the more they can be considered an authentic leader. Avolio, et
al define authentic leaders as “those individuals who are deeply aware of how they think and behave and are perceived by others as being aware of their own and others’ values and moral perspective, knowledge and strengths; aware of the context in which they operate; and who are confident, hopeful, optimistic, resilient and high on moral character” (Avolio et al, 2004, p. 802). Authentic leadership can include both ethical and transformational leadership. Avolio, et al observed that it is not only positive emotions that are involved with authentic leadership, there is also strong condition for trust.

Transformational and authentic leadership are involved with the dramatic changes that organizations are undertaking in the twenty-first century, including top management, middle and lower management, such as program and project managers. Avolio et al (1991) four I’s hypothesis helps to explain how organizations and their managers can maintain an acceptable level of performance relative to their competitors.

Boerner, et al (2007) examined the transformational approach to leadership that also has a strong mentoring and support component. They propose that transformational leadership not only underscores a social exchange and successful knowledge transfer, it also has an organizational citizenship behaviour component. The organizational citizenship behaviour element emphasizes behaviour that he defined as an extra role behaviour with a positive impact on the follower’s performance. It is this positive impact that gives the followers the motivation to give extra effort with respect to their work endeavour. This helping behaviour, being the mentoring component of the organizational citizenship behaviour, also facilitates the stimulation of performance by assisting with integrating new people into a group with the corresponding knowledge transfer. The group can then get to best practices and increase performance faster. Transformational leadership is another manner for leadership to motivate their employees, enhance knowledge transfer and assist the organization with its goals.

Leadership style brings forth organizational structure. Nonaka and Takeuchi (1995) note that most conventional North American organizations follow either a top-down or a bottom-up management structure. A top-down management structure is the traditional
organization where the power and decision making is done from the top and pushed down and cascaded to the lower levels of the firm. The top managers create an idea that is then pushed to the lower levels of management who will then solve a problem and actually figure out how to do it, and then get it done. Bottom-up is the dichotomy of a top-down management structure. This is an environment of autonomy, where employees are empowered to take risks, make their own decisions and be accountable for those decisions. Power is removed from the senior management, and their roles become one of support to the job performers. Klidas, Van Den Berg, and Wilderom, (2006) articulated empowered employees as being given the opportunity to use discretionary behaviour to meet or exceed the customer’s expectations. This could be done through bypassing routine processes and bending the rules if required. This is an important consideration in the fast and lean environment that many organizations now live and die in, as noted in Section 2.3.1 on agile development. These organizations tend to be flat with many layers of management. Dive (2003) identifies two major benefits of a flat organization, the first is that the firm attacks and reduces its cost base therefore it can run the organization on fewer expenses and capital monies with respect to competitors. Secondly, these firms remove a number of the non-value added bureaucratic layers and red tape within the management structure to streamline the organizations both by removing costs and decreasing cycle-time within the processes. The question begs of all of these structures, which one is more conducive to knowledge transfers, developing, educating, and the training of employees? Additionally, organizational values, as argued by Buchko (2007), also have an impact on organizations from the perspective of guiding the organization, as well as the individuals within the firm. The ability to manage large and complex organizations shared values and building a strong organizational culture is an important factor for success, and enhances the performance of the organization.

The answer to this puzzle lies in the way organizations have evolved in the twenty-first century. Organizations are becoming leaner and faster in bringing products or services to market, and thus the structures of firms are becoming much less hierarchical to accommodate this agility. Large, obtrusive organizations with tiers and tiers of management, silos of departments, and many sections of thick bureaucracy are quickly
becoming flat, lean and agile firms. If not, they fail as the leaner organizations will have a competitive advantage. Organizations can exclusively survive by cutting out ineffective layers of bureaucracy and evolving into project-oriented, innovative, fast-paced and fast-thinking machines. Burns and Stalker (1961) argue that these innovative organizations that are attempting to create new and novel products and solutions need a different management approach than those firms in a more stable environment. Burns and Stalker (1961) called these organizations organic systems, and they are able to adapt to unstable conditions. It is these organizations that are able to respond to change very quickly as compared to more bureaucratic, rigid firms. With this ability, of adapting to change, comes a strong demand for continuous training. There is also a strong demand for the successful exchange and transfer of knowledge. By leveraging a bottom-up strategy, an organization can help with this transfer of knowledge among employees. Empowering employees, the organization takes the accountability of continuous learning and gives the responsibility to the employees themselves, creating self-directed employees and teams. The twenty-first century will see those organizations that cling to old ideas and bureaucracy quickly be eclipsed by the agile, nimble, lean, and hyper-educated organizations. As argued by Muczyk and Saber (2001), there is an urgent need for nimble organizations that can adapt quickly in very competitive environments if they wish to survive.

Strategic planning and how it is managed within an organization can also have a negative or positive overall impact to the firm. It is the role of senior management to align activities within an organization back to the strategic plan of the firm. Segars and Grover (1999) argue that it is a fundamental activity that the top management must perform in a competitive environment using six dimensions: comprehensiveness, formalization, focus, flow, participation and consistency. There also needs to be a clear link between what the employee is doing and impacts to the overall goals and strategic plans of the organization. Training is no exception and is needed to be an element of the organizations strategic plan. The new theory for human resource development maintains that training and employee development is an indivisible part of performance improvement and management, as argued by Lynn Johnston (2005) Executive Director of
the Canadian Society for Training and Development. Liskowich (2006) argues that senior management is needed to align the training and competencies of resources that will assist with the overall company strategy and ultimately the success of the firm. Barrett and O’Connell (2001) demonstrate through their research the correlation between organizational training and impact on positive productivity growth. They found a positive and statistically significant effect with respect to training. Kling (1995) maintains that in a fast paced and changing environment, when employees are introduced to formal training, the organization gains a productivity increase of 19 percent over the next three years. The goal is to also ensure that the business gets the most value with respect to the funding for training. Training employees is expensive, as well as time consuming, as it takes the employee away from profit creating activities, and there needs to be a concentrated focus to ensure the training budget is spent in a timely manner, as well as prudently. Another enigma surrounding training is the cost of not training. Campbell argues that employees will leave an organization if they feel they are not getting adequate training and mentoring. The quantifiable financial impact of this is that if an employee leaves an organization, the cost to replace that person is 30 percent of his or her salary (Campbell, 2002). Mitchell, Holtom, Lee and Graske (1993) argue that it is not just money that retains employees, it is the willingness to create long-term development plans for employees or personal development plans that retains their top talent. One of the goals of organizations is to hire, train, and ultimately retain the employees. Training as an activity within the firm needs to be addressed, and action must be taken within the corporation’s strategic plan to fulfil this requirement. From a strategic planning perspective, training needs to be a component of the strategic plan and allotted monies to fund the training program.

Another key role for senior management is to motivate employees to continue with both in-house training and continuous learning outside of the organization such as certifications and postgraduate work. This one behaviour can have a dramatic impact on an employee’s motivation and enthusiasm. Boyatzis (2006) argues that those leaders that inspire employees are in fact moving people in a positive and productive direction. Boyatzis calls this leadership attribute resonant leadership. These leaders have self-
awareness, self-management, social awareness, and relationship management. Employees and subordinates generally mirror a leader’s behaviour. If the leader feels that continuous learning is a priority, then the employees around him or her will come to believe in the same philosophy. Resonant leaders not only inspire employees by their words, more importantly by their actions. The leader must be committed to training by giving employee’s both uninterrupted time for training and the monies for the desired training, both internal and external to the organization. The leaders must demonstrate that they also do not know everything and that they are willing to continually upgrade their own skills and abilities to the changing environment. Tsai (2007) conducted research on employee motivation with the context of turbulent workplaces where there had been downsizing and found that, second only to salary and benefits, it was education and training which employees ranked as the number two reason for job satisfaction. The participants of the survey in phase one of this research worked in a volatile work environment with the overall organization continually losing market share. Over the last number of years, the firm responded with numerous layoffs. These employees knew that at any moment their work team, group or entire department could be terminated without advanced notice. It is the motivation and inspiration from senior managers and their willingness to put the monies into training that also encourages employees. When this is apparent, it is a strong incentive for employees to learn and better themselves and positively impact the organization.

In addition to that listed above, Latham and Ernst (2006) argue that employee motivation is inextricably tied to an organization’s leadership. This thesis goes on to discuss that it is not only so much that a single leader can motivate employees, it is the collaborative efforts of all of the senior managers to influence employees positively. This is in part due to the new environment in which organizations work in the twenty-first century, leaner and less bureaucratic. The working organizations deal with the volatility and uncertainly in a new global environment, as well as the recession that they are experiencing in the early twenty-first century. Another major factor is that the workforce today is well educated with respect to past generations. It is these factors that require a concentrated motivational effort from the entire senior management team to be successful.
With this notion that motivation is not the sole responsibility of senior managers, it becomes clear that those on the receiving end of communications from senior management teams need to accept the communication and be stimulated and encouraged to act on it. Neck and Houghton (2006), arguing on the self-leadership process, rationalize that individuals are looking for self-direction and self-motivation to positively influence personal effectiveness. Behaviour focused strategies attempt to move individuals to become mindful of their self-awareness, the goal being to encourage positive behaviours that lead to successful outcomes. It is also the objective to restrain undesirable behaviours ultimately leading to a successful outcome. Neck and Houghton (2006) also maintain that people that see themselves as being successful at a task and successful on earlier tasks, in this case a successful training session, the individual is more likely to perform better overall. This personal motivation, as well as with the motivation from the senior management, can increase the chance of success for acceptance to training and learning new skills to meet a business need.

With respect to the behaviour of the leadership teams and senior management involvement understandably does have an impact on training team members both positively and negatively. In many cases, training within an organization is required because of a change to a process or system, a change to the market environment, or any other myriad of changes that an organization may face. Change is difficult for most employees, and in many cases change is resisted and in some cases resisted adamantly. It is the role of senior management to initiate and promote many changes within organizations (Kotter, 1995). The manager’s leadership style and behaviour, as well as the working environment, plays a role in the attitudes and acceptance of successful training and knowledge transfer that is used to implement and confront the transformation of the organization. Kotter (1995) discusses eight errors made in change management including results from his studies that leaders who fail in achieving effective change did so out of a failure to create a compelling vision, or to communicate that vision effectively or empowering others to realize that vision, thus matching the management and leadership style to the change management task is very important.
Figure 4.1 illustrates the factors that impact employees’ ability to change. Personal factors such as commitment to learn and trust, and the working environment, can enhance the motivation for people to accept change. Senior level management also impact the employees through their vision, support for change and a lean approach. Leadership styles such as Avolio’s (1991) four I’s and empowerment and leadership influence are also factors that influence the ability of an organization to change. All of these factors are inputs to the ability of an organization to move from a traditional firm to a lean firm. Other factors such as knowledge management tools and supporting training and development (T&D) are inputs to changing to a lean organization.
Figure 4.1 - Factors that impact employees’ ability to change

The next section of this chapter reviews a short exploratory survey of employees from various industries within North America and their interpretation of how senior management should be involved with and their impact to training programs and what in
fact the respondents actually see their senior management doing today. This is an insightful study that helped inform the research data collection phase 3 (see Section 3.6.3 and Figure 3.3 for a more detailed explanation of that phase). It links to this chapter by virtue of its implications for leadership support for learning and development and supports figure 4.1 above.

4.3 Exploratory Research Results of Senior Management Impact to the Motivation of Employees

The value of this survey to my thesis was that it allowed me to better understand salient issues that should be considered in the wider research context. An exploratory survey was used to gather responses on specific questions, and a focus group was convened to discuss these wider issues that were salient to the broader action research phase.

4.3.1 Exploratory Survey Research Approach

A two-question exploratory survey was created by the author of this thesis and was submitted to a small random group of 14 employees within a large telecommunications organization in Canada, as well as posted on a Project Management Institute (PMI®) web page for any person to participate from around the world. The survey was released as follows:

You have been selected for a short two question survey regarding the training programs within your firm. This survey should take less than ten minutes to complete. The two questions relate to the influence that senior management have or have not had on training programs within your firm. Take a moment and reflect on senior management’s impact on training in your work environment. Reflect on if senior management encourage continuous learning and training? Do they support long term training? This survey is anonymous and the results will be used in academic research as well as to improve the training programs within your firm.
Please indicate the industry you currently work in:

Survey Questions:
Q: How should senior management administer overall training in your firm/district/section?
Q: How are senior management administering overall training in your firm/district/section?

4.3.2 Exploratory Survey Research Results of Senior Management Impact to the Motivation of Employees

General trends from the open-ended questions listed above indicated that employees do believe that senior managers should have a strong role with respect to assisting employees with their training requirements. The first question from the survey, how should senior management administer overall training in your firm/district/section brought the following responses. (Note: this is a sample of the responses; see Appendix F for the complete results.)

“Senior management should help employees develop their Individual Development Plan with a focus on enhancing or learning new skills that will benefit the company and help the employee grow.”

“We have an excellent training curriculum but senior management needs to promote and encourage employees to take these courses.”

“Training support is essential and it is support that must be occurring at all levels in the firm.”

“Ideally, they should be involved in shaping the strategy of the business, defining the roles within the company/district and then assisting employees in
defining their career paths within the sphere of what has been defined. They should be as actively involved in training as employees are.”

“(Senior) management should develop annual training strategies, standards/benchmarks for the Department/Districts in partnership with”

It is clear from the survey respondents that employees felt that senior management does in fact have a role with respect to training and their careers. They needed management support and encouragement. Employees needed the uninterrupted time away from work and the monies to take courses that would improve their ability to do their jobs more effectively.

The second question was used to understand what the senior management was actually doing in the respondent’s organization. The question posed was how are senior management administering overall training in your firm/district/section? Below is a sample of the responses.

“Senior management does not promote the training curriculum that is offered by our company.”

“Our senior administration supports in house training and supports tuition reimbursement for higher education. I think this is how it should be. But our organization is departmentally oriented. A lot depends on the support from your particular supervisor or department head.”

“I would say they do a fair job”

“When budget cuts are required, training is the first to be restricted and/or removed.”

“They aren't”
“Disorganized”

The trend in the responses is that the expectation that resources have, and the support that they feel they need from senior management is lacking, versus what they feel management *should* be doing.

It is significant to recall that the survey was conducted using two opposing questions. The first question was to gain the insight into how people felt that senior managers should support training. The second question was to understand what their reality truly is with respect to senior manager’s support or lack thereof. The results demonstrate that employees feel that senior managers do have a critical role with respect to successful training within an organization. The survey also shows that most resources within an organization feel that senior managers are not doing enough to encourage and support ongoing training and life-long training. See Appendix H for the complete responses and Figure 4.2 below.
How should senior management administer overall training in your firm/district/section?

“Our senior administration supports in house training and supports tuition reimbursement for higher education...”

“Senior management should help employees...”

“We have an excellent training curriculum...”

“(Senior) mgmt should develop annual training strategies..”

“Training support is essential and it is support that must be occurring at all levels in the firm...”

How are senior management administer overall training in your firm/district/section?

“Our senior administration supports in house training and supports tuition reimbursement for higher education...”

“My immediate leader is involved in helping me define my career and select the appropriate training path...”

Enablers of Motivation

Figure 4.2 - Enablers of motivation

The results of the survey created and presented by the researcher strongly suggest that senior managers do have a significant impact on learners’ positive and negative motivation to both accept change and learn new skills to meet the needs of the organization, or reject and resist change and oppose learning new skills as depicted in Figure 4.2. Is it the sole responsibility of senior managers to instil this motivation and enthusiasm? No, the results and literature seems to suggest otherwise. It is also the responsibility of the learner to understand the need for change and to ensure that he or she is self-motivated to accept that change and learn the new skills required to meet the additional needs of the organization. Examples of senior managers impacting the learner by way of a reduced amount of motivation were provided in Section 4.2. Without senior
manager’s direction and commitment, employees would have less desire to upgrade their skills.

4.4 Exploratory Focus Group Research Approach of Problems and Opportunities for Project Success

The output of an additional focus group, carried out with a number of employees, conducted to discuss the problems and opportunities for project success is now reviewed. The overall objective was to discuss with project team members the barriers and enablers, problems and opportunities that can positively or negatively impact a project. The audience for the focus group were project team members such as developers, who actually code software, process members, software testers, business analysts, and various subject matter experts.

4.4.1 Exploratory Focus Group Research Results

The results showed that six of the ten participants interviewed selected requirements as the number one reason for negative project outcomes – see Appendix G and F. Changes, or missed requirements were identified as a widespread and familiar obstruction that had to be resolved by the project members once the project was underway, and had a negative impact to the project and the project team. Statements included “projects are delayed due to late requirements” and “We (the project team) are creating the solution when we are testing. We are updating the solution after sign-off. The sign off on requirements is a mute point as there are changes regardless”. This team utilized the waterfall methodology of project management that has the project team plan and sign-off on all requirements before the implementation phase would start. In this case, the requirements were not fully defined by the end of the planning phase, at which time they should be locked in, and the developers needed to adjust to the constant changes of the requirements as the project progressed. This constant change to the requirements required the development and implementation teams to manage the additional rework, including supplementary costs and time to the overall project. Other comments included
“Changes or new requirements are introduced late in the project – the SME’s find this out in the test phase” and “The team lands on a solution and are signed off on requirements – when new resources enter the project they question and want to change to solution”. Again the team needed to adjust to any new change that generated re-work causing frustration for the project team.

Other comments, not related to changes to the requirements, included “Not enough time for analysis up front that results in missed requirements. Don’t get a statement of the business problem”. This comment is related to the project team not being privy to the original business problem or the overall global goal of the project. Another comment of interest was the statement, “The system should not dictate the solution. The SME’s felt that they should be the ones creating the system design requirements – versus the development team”. This researcher personally reflected on this point. The subject matter experts felt, and articulated, that they could have added value during the upfront conceptual evaluation phase, by giving their input into what was possible from a systems perspective, and what other potential options may or may not have been possible from a functional and or technical perspective. This would eliminate the future changes to the requirements, later in the process, that were due to the additional cost of a complex functional and technical solution, that could be resolved by a more simplistic solution, and that could still meet the customers’ needs.

Three comments that fall within the requirements category were related to communication and knowledge transfer. The first is a statement that “There is no set routine, education, or training on how to create a business requirement. There are very different levels in competency with the SME’s (team)”. This comment is noting the variance of competency of the SMEs and their level of education with respect to requirements management training. Part of that training could exploit the knowledge management overlay model being presented in this thesis. The final comment was related to communication channel, “When there is a change to the project solution, or changes to the requirement it is not communicated to all the other impacted departments stakeholders”. This notes that the requirements may be valid, nevertheless,
if there is a change, the modification is not transferred to other team members that need to make appropriate adjustments to meet the needs of the change. As illustrated in Figure 4.3, the focus group’s results outlined a number of barriers to requirements management.

This controlled focus group was used to stimulate thoughts and conversations on problems and opportunities that impact project success. Requirements related issues were less than 40% of the total number of negatively impacting issues. Of those, a number of issues were communication and knowledge transfer related. After reflection of this data, the focus group validated that communication and knowledge management calls for additional observation and investigation and for a resolution, and a concrete solution to be created to assist with the success of future projects.
4.5 Business to Business Exchanges

I have been involved for many years with a large North American telecommunications firm that moved into a strategic alliance with a competing firm. The relationship evolved over a number of years, starting with only a small exchange of work, to becoming grossly interrelated with a number of Business to Business (B2B) systems, to increase productivity and efficiency. The relationship grew out of a continually increasing sense of trust between the two organizations (see Section 2.7.3 on the topic of trust and Section 2.7.4 on trust and partnership). The larger organization, for the purpose of this thesis will be referred to as the contracting organization, was focusing on its core competencies and began outsourcing non-core competencies to reduce costs. The firm that the contracting organization began negotiating with for the outsourcing of tasks will in this thesis be called the outsourcing organization. The relationship started slowly with the large contracting organization outsourcing a limited number of procurement tasks to the contracting organization. The relationship was built around a standard written contract with a number of governance processes and measures that both the contracting organization and the outsourcing organization were required to meet. The relationship matured over time as they continued to work hand in hand (Lewicki, McAllister and Bies, 1998) balancing trust and trust but verify. As the relationship became more and more trusting, the outsourcing organization was given more and more tasks, which in turn continued to increase the trust within the relationship. Unlike that of the Public-Private Partnerships, that ordinarily include a complex contract as defined in Section 2.7.3, this relationship started with a non-complex contract. Nevertheless, over time, the number of contracts increased as well as the complexity, as different responsibilities, activities, and groups of tasks were added. At the time of this writing, the interrelationships between the two organizations were as significant as a single complex contract, but in this case, it was a number of less complex contracts summing up to substantial complexity between the two firms.

How does trust relate to knowledge management and knowledge transfer in this situation of contracts and the dealing of two organizations in a business setting? Do humans confidently and successfully transfer and receive knowledge if they do not trust the
source? As argued by Szulanski (2003), without trust and commitment there is greater knowledge stickiness. If the receivers of information do not have trust in the senders, they are less likely to accept the information of knowledge they are receiving and so knowledge becomes sticky. As argued by Skyrme (1999), trust takes time to create, and only through trust can members be ensured of the willingness and the quality of being able to perform and deliver what one state will produce. Davenport and Prusak (1998) illustrated that a basic disabler to the effective transfer of knowledge was the lack of trust observed in a study conducted in the early 1990s on surgical teams in a New England medical centre. People are reluctant to accept information from people they do not trust. It was observed by the author that the two organizations in fact built a trusting relationship between them, which in turn, enabled the successful communication and knowledge transfer that increased the interactions between the two firms.

4.6 The Impact of Innovation and ICT on Knowledge Transfer

Innovation is the lifeblood of modern day organization, regardless of the specific industry, as described in Section 2.7.1. With innovation, an organization can grow and prosper in its market space. Without innovation, an organization will run the risk of diminished or lost customer bases and the associated revenues, leading up to and including the cessation of the firm. Innovation is a combination of the end users desirability, the market variable and the possibilities of the technology. A large Canadian incumbent telecommunication organization implemented an enormous program named **Innovational** (see Section 4.1.3), to create new solutions with innovative processes, to meet its changing markets, that the author was a direct contributor.

The senior managers started with a view into the current market situation for telecommunication firms in Canada in the early part of the twenty-first century. Many of the large incumbent telecommunications firms in Canada, at that time, spanned not only across Canada but into the United States. These firms implemented a number of new IP solutions for their customers in the early 2000s. New solutions were implemented by bringing a number of SMEs, from within the organization together to work in a new,
innovative, and creative environment to build the processes required for the new
customer solutions. As this was an ongoing program within the organization, a number
of lessons learned employee sessions and surveys were conducted to ensure that all
problems were identified, tracked, and resolved. The premise was to ensure that issues
were addressed and resolved prior to the implementation of future phases of the project,
including the exchange of knowledge.

4.6.1 The Canadian Telecommunications Landscape and the
Innovational Program

Many of the large incumbent telecommunications firms in the early twenty-first century
were in the process of implementing new and innovative internet protocol solution(s) for
their Enterprise, Small and Medium Business (SMB) and consumer markets across the
country. New product introduction was directed toward large enterprise business that can
exploit IP solutions to run their Local Area Networks (LAN) and Wide Area Networks
(WAN). SMB customers were given fully managed network solutions for their data
needs. Consumers were being offered Voice over Internet Protocol (VoIP) solutions that
afforded large incumbent telecommunications firms customers the advantage of toll free
phone service. In the latter half of 2008, large incumbent telecommunications firms were
planning on releasing Internet Protocol Television (IPTV) to their consumer markets.
The entire telecommunications industry across the globe was turning to an IP
communications protocol to traverse data, regardless of whether the data was voice,
video, email, music, social networking, pictures of family and friends to remote video-
surgery where a video and VoIP link is used to allow a medical doctor to complete
surgery on a patient from a remote location. The ability for IP protocols to ensure data
delivery, regardless of the local and remote operating systems and network protocols, was
the enabler for such a dramatic change to this industry and to the millions of customers
that were to benefit from it. For customers, it simply means limitless functionality at a
reduced cost.
These types of dramatic changes to the telecommunication landscape are nothing new to modern telecommunications firms. Disruptive technologies will continue to be developed and then implemented, such as IP, which literally turns the industry upside down. Organizations that do nothing will disappear, regardless of their size, customer base, and past successes. Moreover, new start up firms can and do prosper in this new market space. As demonstrated by Christensen (2003), once a disruptive technology comes into being, existing organizations are required to become innovative to provide their customers with new and improved products and solutions. Internet protocol is a dramatic and striking change and is understandably a disruptive technology to the modern telecommunications industry worldwide in the twenty-first century. This change will see all telecommunications firms radically alter the way they do business. Industry reaction will be to change both the current business model as well as cost structure, if they wish to survive. Businesses are now required to adapt and be innovative to combat this new disruptive change to their environment in longstanding markets. With these radical changes, there is a need for the organization to be able to communicate within itself to be successful. New knowledge has to move among the employees if the firm is to be successful.

During this time, large incumbent telecommunications firms have not stood idly by as their markets began shifting, evolving and, in many cases, eroding. Early in 2003, the planning of a unique program called Innovational undertook the creation of a number of new IP-based product lines and operational process re-engineering’s beginnings. The program was required to address high-level strategic and operational planning, mapping of the newly defined operational process, staff and sales training, systems upgrades, and the introduction of a number of partnerships with third party service providers. Furthermore, for the program to be successful, employees needed to embrace new ways of thinking, as the products differed considerably from the existing services delivered at the time by the large telecommunications firms. The program attempted to create the processes and environment to facilitate an atmosphere that would, among other things, include extensive upfront training, which would encourage significant knowledge transfer. As with all new product introductions within the telecommunication industry,
The large incumbent telecommunications firms did not have the luxury of time, as the project timelines were extremely aggressive in an attempt to beat their competitors to market, with the innovative and exceptionally complex IP solutions.

4.7 Innovation

Kim and Maugorgne (2000) argue that successful innovators have to focus on the products practical use or its inherent usefulness if it is to be profitable. With respect to the large incumbent telecommunications firms, they were moving from 125 years of successful legacy products that have served them well in the past, and have created outstanding revenues year over year. At the time of this writing, they were moving to a new innovative IP product solution. The large incumbent telecommunications firms were obligated from pressures of sudden and intense competition, to recognize and take full advantage of the new products that would positively impact their customers and continue to maintain a positive cash flow. IP services in fact do offer customers new and innovative solutions that will increase their network and communication productivity, as well as simplify their overall communications needs. This increase in functionality, as well as offering customers an intelligent device onto their networks, is the utility that Kim discusses above. The large incumbent telecommunications firm’s IP solutions did in fact have a strong sense of customer utility that was established from the many new and innovative ideas that came from the Innovational program.

The large incumbent telecommunications firm’s IP Solutions, Innovational IP Solution for SMB and Innovational Internet Protocol – Virtual Private Network (IP VPN) for its enterprise customers, were the outcome of the Innovational Research and Development (R&D) team over the course of many months. These products were then placed onto the Canadian market, having been launched in March 2005. The question now is how could a large telecommunications firm move into innovation, creativity and knowledge management (KM) based perspectives continue the momentum, and more importantly, improve on the program?
From an innovative perspective, the large telecommunications firm put in place an environment that would be conducive to both innovation and collaboration. This was done by co-locating the resources in one location in Toronto, Canada. One of the foremost reasons for the co-location was to remove the barrier of geographic disparity in the communications and knowledge transfer process between employees. It was felt that if people were in fact sitting only a few steps away from each other, they would converse and transfer knowledge more successfully. As well, as training all the resources on the new end-to-end processes, giving them an appreciation of the up and down stream effects they could impact, they were given the freedom to challenge any and all processes that they felt were not the most effective. Open and honest communications was pursued with a number of feedback loops, such as continually surveying the employees, letting employees know that their input was important and valued, and that the management in fact trusted their decisions to improve processes. The new IP products were extremely complex, and as argued by Van De Ven (1986), this complexity could be overcome with the use of SMEs who understood their unique piece of the overall scope of the new product. This team was selected from the best of the best within the entire organization, and to ensure success, and they were brought together in a radical collocated environment.

As noted by Walker and Hampson (2003), innovation is about change. The Innovational program was implemented to transition not only the firm’s products, but evolve the organization into a new business model, cost structure and culture modification, starting with this much smaller team. This would not be an easy task for an organization. At this time, the organization had over thirty thousand employees that needed to understand not only the need for change and understanding how to make the change, they needed to understand the urgency and the impact, if they did nothing. The changes that were required for the firm to stay competitive needed to be clearly communicated, embraced and understood by the employee base.

Walker and Hampson (2003, p241-242) identify five major characteristics of innovation related to projects based on the work of Tatum (1989). The first is the ability to
reorganize forces and the opportunities for innovation. For telecommunication organizations, the change from a circuit switched network to an IP based network within the telecommunications industry worldwide was a trigger for tremendous innovation and improvement. Second, is the need to create an environment where innovation can grow freely. The **Innovational** program created a clear vision that was continually communicated to all employees within the organization. A number of tools and techniques were introduced to assist in addressing the many changes that were facing the firm, such as a Culture Change Team (CCT), to ensure that the culture change was in fact managed appropriately. Additionally, a Continuous Improvement Team (CIT) was formed to identify, prioritize, resolve and track the many problems and opportunities from the new processes that were about to be created. Third aspect of innovation is the provisioning of new technologies. This is not an unusual step for most networking and communications organizations, as their core business is technology, and they tend to be adept at developing and exploiting these new technologies. Fourth, there is the need to develop the innovation. This team’s chief goal was to create the innovation. Finally, there is the demand to implement. Without actually implementing something, this would all become a mute point. Through this systematic process, innovation can be cultivated and given the opportunity to grow and prosper.

### 4.8 Knowledge Management Perspective

From a KM perspective, the R&D team’s project included a plan to ensure that all job performers would actually be processing the live customer orders for the new solutions and would gain the skills and knowledge needed to execute them successfully. This knowledge advantage is established on three essential pillars: the Information and Communications Technologies (ICT) infrastructure, leadership, and people infrastructure (Walker, 2004), as rationalized in Section 2.7.11 in Figure 2-12.

The large telecommunications firm’s ICT infrastructure was created via a web portal to a site named **Docs Plus**\(^9\) to house all relevant documents related to the program. This

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\(^9\) Docs Plus if a fictitious name
included all processes, communications, resource lists, surveys, and results and lessons learned. All employees, from coast to coast, including sister companies and partners, were given read only access to the portal. This would provide the opportunity for everyone to adhere to the processes regardless of geographic locations. The Docs Plus portal gave all employees the ability to learn and understand all of the new processes. The training team also used the portal to post training documents that were used during the training, sessions and training videos that were created. The premise was to guarantee that all employees had access to what they needed to learn, grow and transfer knowledge amongst the various teams regardless of location.

Leadership was also a significant piece of the success of the KM training and knowledge transfer process. A vision and project plan was created by the Human Resource Communications Director of the project for the sole purpose of training and knowledge transfer to the Innovational job performers. A national training team was established with actual job performers to ensure consistent and timely training was conducted across the country. The team’s mandate was: To ensure we deliver consistent and timely training to our job performers. Job performers require and deserve quality training sessions and we will deliver just that. The team grew to over 20 individuals, many being part-time trainers, that sat with other employees and transferred knowledge considered on-the-job training. This team was accountable to train a resource pool of close to 150 resources. As noted by Walker (2004), it is the responsibility of the leadership to create and then maintain the vision of KM, and this was indeed the case for this program.

With respect to people infrastructure, Walker’s Knowledge Advantage model, as established in Section 2.7.11 Figure 2-12, breaks people enabling infrastructure into two main subcomponents (Walker, 2004). Table 4.1 depicts the Knowledge Advantage enablers and the links to the outputs of the case study results.
Table 4.1 - Links between knowledge advantage enablers and case study results

<table>
<thead>
<tr>
<th>Knowledge Advantage Enablers</th>
<th>Case Study Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organizational leadership enablers</td>
<td>Strong visions statement that is continuously communicated</td>
</tr>
<tr>
<td>Organizational leadership enablers</td>
<td>Trust</td>
</tr>
<tr>
<td>Organizational leadership enablers</td>
<td>Motivation of employees</td>
</tr>
<tr>
<td>Power leadership enablers</td>
<td>Empowered employees taking action to solve problems</td>
</tr>
</tbody>
</table>

The first of these subcomponents of the Knowledge Advantage model illustrated in Figure 2-12 in Section 2.7.11 is social capital, or the total actual resources available for the program gained by a network of associations. The second, process capital, is the processes that are part of the program. One of the more difficult enigmas surrounding the social capital aspect is the issue of trust. At the time of the writing of this study, the telecommunications industry was in a state of enormous transition, and a number of the large incumbent telecommunications organizations were under significant and relentless attack from their competitors. This in turn forced large telecommunication firms to downsize many tens of thousands of employees in the preceding years. This incubated a sense within the employee base of gross distrust, apprehension and a myriad of other negative emotions. The telecommunication firms had lost untold tacit and explicit knowledge when employees were terminated, because of cost cutting. Building trust and commitment, a prime ingredient in social capital, was a tremendous struggle within the organization. In an attempt to counterbalance this natural distrust, the large telecommunications firm was working hard to ensure that the employees of the program would see it as the new way to provision services, and that this would be the road to renewed success and opportunities. This was to be more than just another new product, it was to be a fundamental new way to run the business. Training and knowledge transfer was also to be a major part of the new telecommunication organization and is part of the Figure 2-12 in Section 2.7.11 ICT System Support component of the model.
From a process capital standpoint, a number of reward systems were also being built via a recognition program. One new approach was to give the job performers the ability to problem solve issues that directly affected them. Once identified, the job performer could go and speak directly with the research and development team member to initiate a fix. This gave the job performers some ‘skin in the game’. Rather than being on the sidelines complaining to each other, as they had in the past, which was due to not believing that anyone would listen, they could now stand up and be heard and positively influence the processes that they worked with every day. A people-enabling infrastructure was another component of the Innovational project that required a concentrated effort to implement. By exploiting various collaborative websites, such as web portals and Wiki’s as collaborative tools between the teams, they became more interactive with discussions on improvements, problems, technology and gaps in the processes. The portals gave the team a unique opportunity to talk virtually and exchange the rich tacit knowledge that they held between people and teams.

4.9 Creativity

Creativity, took an alternate path within this team. Again, the premise of the contained and controlled environment for the Innovational R&D team was to create surroundings that would encourage and contribute to the progress and growth of creative thinking. With respect to creativity, it is described as an idea or solution that is appropriate of value and actionable as described by Amabile (1998). Both the Innovational IP Solution and the Innovational IP Virtual Private Network (IPVPN) indeed met this requirement, nevertheless, only to a limited degree. Upon reviewing a number of lessons learned sessions, there was room for improvement. The Innovational R&D team focused on the processes of provisioning the new product line. The assumption was to be able to simplify the solution for the customers, as well as to get the solutions provisioned in an unprecedented eight day cycle time versus the industry standard of 40 days. This fit with the definition that Amabile (1998) gives on creativity is a solution that must manipulate the processes. In fact, the Innovational team started from scratch and built the new processes based on business tasks, not by what each functional group had done in the
past. This meant that some tasks would in fact move from one group or department to another. In some cases, actual tasks would be contracted to outside vendors. This environment did in fact stimulate business and process creativity, by no means to its potential. The reason it did not meet the full potential was due to the team not being able to bring the provisioning cycle down to the expected timeline of eight days. They reduced the timeline significantly but were never given the time and resources to complete their goal before the output of the program was placed into the operations of the overall organization, and this skunk works team was disbanded.

The management for Innovational’s creativity was facilitated by a single Project Manager (PM) who was under the direction of the overall program Vice President (VP). Amabile (1998) places business creativity into three categories, 1) expertise, 2) creative thinking and 3) motivation. Although the first two elements, being expertise and creative thinking are by far the most difficult to achieve, and the most time consuming, it was in fact the motivation component that eluded the Innovational R&D team. The R&D team was populated with the best SMEs from within the large telecommunication firms, as noted above. They came from all across the company as well as from across Canada, to come together and ensure that the skill sets and knowledge were in fact in place. The creative thinking ingredient was introduced successfully by the PM and was carefully facilitated to ensure that old school thinking did not return. The issues arose when the PM attempted to not create motivation, but instead to maintain the motivational level of the team under the pressures of the time constraints placed on them from the VP team. The team quickly lost motivation because of the program VP’s continual reduction of timelines, in an attempt to get more productivity from the team, rather than innovations.

Unfortunately motivation, being the last of the three pillars outlined in Section 2.7.11, was not given the due diligence required to reach its full potential with this team and program. Innovative actions, such as process improvements, took a significant amount of time to produce positive results. Innovation was stifled and subdued because of the mistakes and rework that occupied the resources time in this environment. Also, as the complexity of the process increased, so did the amount of wrong actions that were
attributable to bad judgment, due to the fact that innovation is based on something that is both new and novel and filled with unknowns. As a result of market pressures, the large telecommunication firm and the **Innovational** R&D team did not have the luxury of unlimited time. Team members were under tremendous pressure to meet their senior management’s tight timelines to get to market with their new IP solutions. The pressure on the team was palpable, and at times crushing, with a number of resources suffering from personal breakdowns. The limited time constraint led to high stress levels, to the point of turning the new environment into a toxic ether during the last phases of the program. Daily conference calls to update the VP team on the progress of the **Innovational** team were filled with shouting and fiery arguments, as well as blaming and finger pointing within the team. The motivation of the team quickly evaporated as the members began to feel that their contributions did not matter any longer and that only meeting the deadline had significance and more importantly, value. The creativity ingredient within the **Innovational** team was damaged beyond the point of repair in the closing phases of the program. As the resources struggled with the pressure, there was an equal reduction in positive communication and next to no true knowledge transfer. Knowledge was turned into a commodity to be held by the individual, and used as leverage to gain personal credit and potential advancement.

4.10 Room for Improvement

With all of the strategic planning, vision statements, endless communication, and the creation of a controlled, contained, collocated location for both the R&D teams and the job performers, the process was long, difficult and not exempt from problems. There was a lesson learned process that was embedded into the program that identified a number of possible improvements that continued to the end of the program. The first observation was the fact that this large telecommunications firm was particularly poor at adhering to project management ideologies. Brook’s (2004) paper on Worst Practices in Project Management, outlines a number of fundamental errors made with respect to not adhering to project management ideologies. First are having the wrong people in the wrong jobs. The **Innovational** team had a number of senior managers at the beginning of the program
that were not the right fit for what the program was set out to accomplish, being an innovative program. Many of these senior managers had significant years in the telecommunications industry, and their ‘old school’ style of thinking and management had them clinging to their worlds of command and control, and ruling with an iron fist that served them well in the monopolistic world of telecommunications industry in the 1970s, 1980s, and even the early 1990s. Yet, in the twenty-first century world of collaboration, teamwork, and giving employees the autonomy to work with limited supervision, their old schools of thought were a disabler to the innovation process. This dichotomy of ‘old school’ senior managers versus the fast pace of an innovation team in a competitive marketplace, did not work, and literally crippled the power, style and authority of many of the senior managers. As supported by Kaufmann (2003), these senior managers were caught in a success trap. In the success trap, managers and organizations rely on their past successes and experiences and will not adjust to the new demands of a changing environment. Large telecommunication firms are organizations that have had over 100 years of success, although the majority of those years were in a monopoly situation. As a result, as the program progressed, a number of these senior managers were in fact moved out of the program, and application of more and more project management expertise was moved into the program.

The data collected from the focus group in the next chapter (see Appendix I) showed that there was a lack of resources assigned to actually implement the new customer orders. Given that large telecommunication firms have spent the last ten years of the twentieth century, and continue well into the twenty-first century, right-sizing their workforce by terminating employees, there was just not enough resources to do the work. This has placed the Innovational program in a precarious position as resources were pulled from the legacy markets, which were already understaffed, and were not in a position to release people into the Innovational program, hence the company continued to attempt to staff both the new Innovational program, as well as existing legacy customers with an ever diminishing staff level. Literally untold hours of time and energy were spent quarrelling and negotiating to secure resources between the various groups. As noted by Thamhain (2004), staffing for technology projects is particularly susceptible to failure if they are
understaffed. Budget and resource constraints lead to understaffing, or the wrong people were assigned to the project. Both are critical to the project’s success. From this author’s and shareholder’s perspective, the time and energy spent fighting over resources could well have been spent fighting our competitors. This type of internal conflict continued and had little to no value.

Finally, at the end of Innovational’s first phase, the team’s focus moved to production and away from innovation. The R&D team that originally was given the latitude to create an environment that fostered innovation and creative thinking slowly decayed. The program had a number of phases, and the R&D team was to create process solutions for each phase. Once the first phase was completed, the focus dramatically shifted from creation to production. The R&D team members were literally assaulted with issues regarding Phase I of the project, when their time and attention was needed to meet the Phase II timeline. The team attempted to do it all, however, it quickly became strained under workload demands, and as a result, the innovative and creativity mindset shifted from innovation back to the old school thinking of command and control in the production of live orders. Senior managers, once they had Phase I completed, focused all of their attention on Phase I production results, and the innovation of Phase II was prioritized to the bottom of their list of priorities.

4. 11 Summary

Looking into the future, five to ten years from the beginning of the twenty-first century, what could have been done at that moment to nurture the ability for large telecommunication firms to continually improve their capability to create innovative solutions? The simple answer is keep doing what is working well and stop doing what is pushing people back to the old schools of thought. Unfortunately it is not that simple. It is important to plan for and implement the many infrastructures, both hard and soft, that support innovative and creative thinking. This would include such methods as Walker’s (2004) knowledge advantage model that is based on ICT, Leadership and People. Building a database to house information for knowledge is an easy thing to get up and
working quickly. Nevertheless, it is the many people issues, or the soft issues, that pose the greater difficulty. Very quickly, as discussed above, a toxic environment can be born in a troubled industry that will oppress human potential, innovation and creativity. The leadership of the firm must embrace innovation and reward those who are supportive of change. The employees do need to feel a sense of urgency, yet they need the time to adapt to change and must persistently take that time to change the processes and continually re-engineer the company. The entire employee base must embrace the visions of the leadership. If the leadership does not believe in the vision, the employees will not be far behind. It is the actions of the leadership, and not their words, that the employees believe as discussed in Section 4.3.1.

The culture of the organization needs to become comfortable with the new world of competition and constant change. This is the time when the leadership needs to ensure that the vision of the organization is clearly and consistently articulated to all employees. The message must speak of the changing world around us, and that this frontier is our new market space. Support must be given to those who take risks and look for new and innovative ways to get things done. This is a transitional time for an organization, and employees look to the leaders for guidance and direction. The leadership should create and deliver the vision and most importantly, accept it themselves.

Knowledge management is a vital component to the success of the program. A number of ICT infrastructures had been established, as well as strong leadership support, with the goal being to build a sustainable process and approach for the successful KM and knowledge transfer within the firm. The advantage of implementing a knowledge advantage model supported the team in the building of trust and a reward system for the job performers. As noted earlier, trust is the key for the successful transfer of knowledge from sender to receiver.

A number of lessons learned led to recommendations and fixes that moved the project forward. The lessons learned database continues to be utilized, and is a trigger for the Continuous Improvement Team (CIT), and is working effectively. The lessons learned
were a major part of the knowledge transfer process as best practices arose during these retrospectives that were then communicated to the larger team. The chapter also reviews a focus group that examined the problems and opportunities for project success that were given to a number of project managers, project team members, business analysts and software coders and testers.

There are a number of recommendations that can be put into place today to ensure that innovation and creativity models continue to improve and evolve over time. These include strong leadership and an ICT infrastructure. As well, the employees of the firm need to feel a sense of urgency toward, and embrace change, and continue to focus on the end goal, that being creating innovative products and solutions.

4.12 Chapter Summary

This chapter has illustrated the impact of leadership and its behaviours, on the successful or unsuccessful knowledge transfer in a business setting, and demonstrates the linkages between them. The chapter examines both motivation and leadership and its impact and also scrutinizes successful implementation of a training program that was impacted by senior managers. Table 4.2 list both the mandatory factors to effective knowledge transfer and the contributing factors to effective knowledge transfer.

<table>
<thead>
<tr>
<th>Mandatory Factors to Effective Knowledge Transfer</th>
<th>Contributing Factors to Effective Knowledge Transfer</th>
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<tr>
<td>Leadership behaviour to motivate</td>
<td>Leadership mentoring</td>
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<tr>
<td>Employees acceptability change</td>
<td>Trusting environment</td>
</tr>
<tr>
<td>Employees motivation to change</td>
<td>Innovation</td>
</tr>
<tr>
<td>Employees capability to learn</td>
<td>ICT</td>
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<tr>
<td></td>
<td>Creativity</td>
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<td></td>
<td>Time and resource availability</td>
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</tbody>
</table>

This chapter also reviews the results from an exploratory focus group and survey that was conducted to uncover the specific reasons for the negative impacts to a project, up to and including, project failure with the participants being project team members and subject
matter experts, such as software developers and business analysts. The output of the survey is linked to a number of current organizational behaviour theories and is used in the next chapter to reinforce the requirement for the knowledge management model being developed throughout this thesis.
Chapter 5 - Case Study of Factors Influencing Knowledge Transfer

5.0 Introduction
The purpose of this section of the thesis is to explore, and specifically, to better gain insight into the effectiveness of the knowledge transfer that occurred, relating to a particular process and product innovation, within a highly dynamic and intensively active skunk works team, and between members of that team and key implementers of the processes developed in the studied organization. The development and roll out of the new process was considered a change management project, and as such, is relevant to expanding insight in the project management literature. This project can be described as a vanguard with a great deal of bottom-up learning taking place that is planned to be broadly diffused (Brady and Davies, 2004) to the wider organization. These types of projects have been identified by Arrto, Martinsuo, Dietrich and Kujala (2008) as skunk works type projects, with high levels of project autonomy and relatively low levels of stakeholder complexity. They identify benefits of providing role models for the organization to adopt and to radically change its future. The focus of this section will be on knowledge management and knowledge transfer in a practical setting. This chapter is based on an amended and expanded version of the paper presented, reviewed and accepted at the 2008 PMI Research Conference in Warsaw (McKenna and Walker, 2008).

Two key concepts will be considered relating to the studied organization: the nature of knowledge and knowledge transfer, and the role of knowledge management and organizational learning (OL). The context of the situation and the organization’s characteristics will also be explained, as well as the research approach rationale.

The context of the case study organization will first be presented so that readers understand the research setting. This is followed by the rationale for the adopted research approach and a description of the research design adopted. Definitions of terms used and
explanations of the theoretical framework will then be presented. Finally, findings are summarized, and conclusions are discussed by presenting some implications for project management practices.

5.1 Context and Case Description of the Study Organization

The organization being researched is a large North American telecommunications firm that currently provides numerous communication services, such as local and long distance phone services, wireless communication, internet access, satellite and (IP) television. For the purposes of this thesis, the firm will be called XYZ Telcom.

Rapid, volatile change and expansion of this marketplace, characterized by continuous evolution of new products, led to an interest in how managing the firm’s knowledge resources might form a useful element of the firm’s strategic plan. The President and Chief Executive Officer of XYZ Telcom spoke in its 2004 Annual Report directly of planning to change the culture and ensure that XYZ Telcom does not tie up good ideas (XYZ Telcom Annual Report10). Tremendous turbulence and flux in the marketplace are common features of the world of telecommunications, as more and more competitors move into this market space. Established telecommunication firms (Telcos) are currently under relentless siege from an almost limitless and inexhaustible number of new competitors.

The XYZ Telcom needed a new and different competitive advantage to compete successfully to continue to maximize share prices. Necessary competitive advantage can be provided with better KM leveraging and developing the agility to quickly develop its products, and rapidly get these products to market. Companies such as XYZ Telcom possess superior knowledge of its people within the organization. Nevertheless, as Zack (1999) puts forward, firms must be able to coordinate and combine their traditional resources, as well as capabilities in new and distinctive ways that will provide more value

10 The citation is not included as it would obviously reveal the identity of XYZ Telcom.
to the end customer, as well as have the ability to transfer this knowledge among the employee base. Without these activities being successfully implemented, the organization can lose competitive advantage.

Competition for incumbent firms such as XYZ Telcom comes from numerous sources ranging from large local cable companies, to small start-up firms that can become a Voice over Internet Protocol (VoIP) phone supplier. Threats to incumbents, as argued by Porter (1985), within the telecommunications market become more acute as barriers to entry decrease, and suppliers and customers bargaining power increases. These new players compete directly with traditional telecommunication companies, such as XYZ Telcom, and erode their well established revenue streams. Incumbent phone companies are suddenly forced to face their competitors head on by formulating innovative solutions to maintain and grow their current customer base. Those that choose not to evolve face massive losses of their customer base and the associated decline in revenue (Yocom, 2007). It is fundamental that companies such as the XYZ Telcom embrace these new technologies and exploit their position in the marketplace, to continue to grow, prosper, evolve and ultimately survive.

XYZ Telcom was given a unique opportunity to develop a new product line, called the IP XXX for their business customers. XYZ Telcom engaged a number of research and development skilled employees, hereafter referred to as “resources” and as “operational staff”, and removed them from the mainstream organization, placing them in a controlled and contained maturation environment - a skunk works. The term skunk works was adopted to describe a group of highly innovative and non-conforming individuals that have been put in an isolated work environment to develop radically new ideas. For example, skunk works have been successfully used in the Cisco organization (Tulley, 1998) and within engineering enterprises such as Lockheed in the 1930s (Gwynne, 1997). These feral units present extreme and often unique examples of innovative organizations, and so can only be studied as single case studies. XYZ Telcom went further and created a CoP (see Section 2.7.8 for the theoretical discussion of CoPs) that was contained on the top floor of a North American major city office building. This team started as an
informal group yet quickly came together to work the many problems at hand. An irregularity of the team was that this group of resources would create extremely novel processes needed to address the many new IP products being introduced within the market streams for XYZ Telcom. Also, there was an expectation that the team would be leveraged to help change the cultural bias of existing employees within the larger firm, moving them closer to operating as a knowledge valuing firm. This could be achieved by enhancing knowledge transfer processes initially within the R&D team, and subsequently diffusing these processes out into the entire organization.

As the R&D team continued to refine the new processes in early 2005, actual job performers were introduced into the environment to test the practical application of these new processes. A team of trainers was established in conjunction with these activities to ensure the successful transfer of knowledge from the R&D team to the job performers. The training team of resources, with a training background, was chosen from within the firm from across the corporation. The training team was burdened by a number of factors for instance, that the new process was not familiar to them, and there were time zone differences and language constraints because the organization operated in two provinces and in the French and English language.

The overall program was required to address high level strategic and operational planning, mapping of the newly defined operational process, staff and sales training, system upgrades, and the introduction of a number of partnerships with third party service providers. Furthermore, for the program to be successful, employees would need to embrace new ways of thinking. The program attempted to create the processes and environment to facilitate an atmosphere that would, amongst other things, include extensive upfront training and encourage knowledge transfer, as well as ongoing training, as the teams adjusted to the changing product solutions. This team was not only substantially trained for the onset, there was also a strong emphasis on continuous learning, continuous improvement and the use of best practices, including those that they developed in house. The telecommunication firm’s senior managers were also offering
employees both the motivation, support and the tools to continue to train themselves on the latest techniques in both technology and management disciplines.

A specific question that arises from this case study is why was it so difficult to extract tacit knowledge from skilled employee resources and what are the barriers hindering the productive and successful exchange of tacit knowledge? Using a survey of a small sample group of seven trainers and subject matter experts, from a base of 20 trainers that form a training team within XYZ Telcom, a number of barriers to the exchange of tacit knowledge is discussed next. This dedicated and highly skilled training group, The National Internet Protocol Virtual Private Networks (IP XXX\textsuperscript{11}) training team is accountable for understanding, coding, and training job performers for the various tasks of processing IP XXX orders for Enterprise and Small and Medium Sized Business (SMB) customers across North America. The many processes created to accomplish this task come from the R&D team that was collocated within the same building and floor as the job performers, trainers, support staff and management.

5.2 Theoretical Framework

Knowledge management, as discussed in Section 2.7, relates to the creation, transfer, storage, and use of knowledge by individuals, groups, and organizations (Nonaka 1991; Davenport and Prusak, 2000). In the context of this case study, XYZ Telcom needs knowledge to be competitive in three ways. First, in a fierce market, its knowledge can be leveraged to increase efficient and streamline processes and attain a cost competitive advantage. Second, for a customer-focused competitive advantage, it needs to know what its market needs actually are, for example, by working with customers on beta versions to empathetically design solutions (Leonard and Rayport, 1997). Finally, firms need to effectively use their knowledge to provide unique services or product adaptations to achieve a differentiated competitive advantage.

\textsuperscript{11} The name of this work group has been changed to protect their identity
5.3 Research Approach for this Focus Group

The primary research approach and data collection was the focus group technique with a small group of participants being interviewed by me. This research approach was selected over self-administrated open ended surveys for its rich and stimulated interaction between participants (Bristol and Fern, 1996) that can be acquired in a focus group setting. Kidd and Parshall (2000) argue that the focus groups methodology, which is conducted within the lived experience and culture of the research participants’ environment, pulls out the rich research data needed for analysis.

This KM theoretical framework formed a set of questions that were posed to a group of seven training representatives who had been intimately involved in day-to-day support of transferring both explicit and tacit knowledge relating to the new processes surrounding the process developers, and the job performers testing the process within the skunk works, as well as in regional centres. The seven participants were chosen as being a representative sample group of trainers from the larger training team. Each of the process groups were represented, as well as each geographic location, being Ontario and Quebec. The environment that was created for the IP XXX solution was named the IP Team\textsuperscript{12} for the actual job performer and the IP Process Team\textsuperscript{13} for the R&D team. From the start date of the IP Teams, and the timing of the focus group session, a period of one year had elapsed from 2005 to 2006. This gave the members of the focus group a long enough period to truly understand what was and was not working well with respect to knowledge transfer within their environment, which strengthened the validity of findings.

The focus group was conducted live using a conference bridge simultaneously to the geographical locations. The high end R&D skilled employee resources, whose task was to disseminate and transfer their knowledge to others in the field, were given a short seven question survey with ample space for comments. In an attempt to reduce bias, the

\textsuperscript{12} The name of this work group has been changed to protect their identity
\textsuperscript{13} The name of this work group has been changed to protect their identity
participants were instructed to print the survey ahead of time, and to not read the questions prior to the focus group. The survey would in fact be conducted during the focus session. After the survey was completed, the session was facilitated by me, and the participants were solicited with five specific open-ended questions. The questions were asked to each participant individually, with the other participants being able to agree, disagree or augment what they had heard. The participants were directed to ensure that their answers were from their perspective and experience only.

The objective of the focus session was to identify the barriers and enablers of both tacit and explicit knowledge within a real world environment, and to identify constraints and contributory events and situations in the environment, and what could be done to augment this knowledge transfer. The results of the focus session dated February 23, 2006 follow.

5.4 Focus Group Data Responses

The written survey consisted of seven questions posed to summarize discussions after a short introduction to the focus group and explanation of a number of terms that would be used in both the survey and subsequent open discussion (see Appendix I). Responses to questions were rated on a scale of 1 to 5 (1 being “Strongly Disagree/Very Low” and 5 being “Strongly Agree/Very High”). Participants were also given space to add their direct comments.
Table 5.1 - Survey Responses

<table>
<thead>
<tr>
<th>Question</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 What was the quality of training you have received within the IP Team</td>
<td></td>
<td>2</td>
<td>3</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>2 Did you find that you were able to retain new knowledge that you</td>
<td></td>
<td>2</td>
<td>2</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>received.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 How important is it to be a Community of Practice (CoP) being networked</td>
<td>1</td>
<td>1</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>together as a team to within the same office?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 How important is it to be a Community of Practice (CoP) being networked</td>
<td></td>
<td>3</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>together as a team to virtual?</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 Did you feel you had the opportunity to integrate your ideas into the</td>
<td></td>
<td>2</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>training session? (Note: there was one “did not respond” on this question)</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>6 Did you get enough hands-on, or cases studies to augment the training?</td>
<td></td>
<td>4</td>
<td>2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7 Do you feel that there should be a mechanism to “test” knowledge</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>retention?</td>
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</table>

The responses to all of the questions show a weak clustering other than questions three and four related to the CoP. There was a strong view that people were either neutral or agreed that they had enough hands-on experiential learning in their training program (question six). All participants felt that it was important that the team members were a part of the CoP, even if it was only at the onset of the project. It was felt that being in the same office or in different locations, with the tools available today, such as email, net meeting and internal Instant Messaging, was of little consequence to maintaining the sense of a community. Comments on the survey with respect to the CoP noted that it assisted with communication and team spirit. Concerning the transfer of tacit knowledge, it was noted in the questionnaire comment field that unless one has face-to-face (F2F) interaction, it “makes tone harder to read and defensive reactions harder to (perceive) and mitigate”. Similarly, a virtual CoP also was felt to be effective as long as the communication tools were available and utilized to mimic F2F interaction. One barrier to effective knowledge exchange and transfer within the CoP was the ability to overcome language differences. One location was predominantly French speaking and the other, for the most part, English speaking. The resources that did in fact not speak both
languages felt at a disadvantage when the conference calls or net meetings were conducted in a language other than their mother tongue.

The focus group session next moved to an open question and answer segment that provided opportunities for yielding deep tacit knowledge from this team of high-end resources. Each member was asked the same question and was given time to bring his or her personal experience or thoughts to the topic. They were also asked if they agreed or disagreed with other members’ comments, and to add or build onto them. The facilitator, being the author of this thesis, exclusively presented the questions and at times, asked the resources to elaborate on their answers as required in an effort to reduce any bias that the facilitator may introduce.

The first question generally sought the participant’s high level thoughts and was also used to broadly stimulate ideas among the team. The question posed was with respect to the IP Team environment and the training, and transfer of knowledge “What works well? Why?” Six of the seven participants agreed that hands-on activities were by far the most efficient way to transfer both explicit and tacit knowledge. It was felt that issuing or working on actual live orders augmented tacit knowledge, as the participants found real life problems in the orders that they had to resolve. F2F training was also gauged as a superior forum for the transfer of tacit knowledge, versus a conference call with net meeting software. (Note: net meeting software gives the participants the ability to all view the same computer screen. This screen is generally controlled by the trainer of the training session). The participants found it too easy to be distracted by people around them or incoming phone calls when participating via a conference call. There were also a number of destructive distractions, such as the lure of reading and responding to email or engaging in a side conversation via instant messaging during the knowledge exchange. Documented job aids were also not conducive to tacit knowledge transfer as they generally cover a best case scenario and did not delve into the rich tacit body of knowledge. It was agreed that job-aids and other forms of documented knowledge are limited to being only effective for explicit knowledge transfer.
The second question, relating to the IP Team’s environment was “**What barriers are there to retaining knowledge in this environment? Why?**” The respondents identified a number of constraints obstructing both tacit and explicit knowledge retention. They found the following issue frustrating: five of the seven felt that the environment was replete with constant interruptions - job performers were simultaneously working on live production orders while coping with a constant influx of emails and daily conference calls. The most destructive distraction was a production order that was an escalation. An escalation can be defined as an order that is in jeopardy of missing the customer due date and is given preferential treatment. In most cases, the job performers are expected to drop whatever they are doing at the moment and manage the escalation through to fruition. Four of the seven participants also felt that the IP Team was by and large understaffed, leaving even less time for quality training and knowledge transfer. Another destructive distraction issue, from a tools perspective, was that all employees had access to an internal Instant Messaging (IM) system. This gave job performers the ability to IM each other to instantly ask questions or engage in general chatting via the network. The person receives an instantaneous pop-up message that appears on his or her computer screen with the questions the sender is transmitting. It was noted that this is a wonderful tool for senders as they can get an answer to a question very quickly. However, for receivers, this is distracting as they are pulled away from their current work tasks. It is noted that the team did have a team charter document that was used as the rules of engagement for the project team. Part of the team charter was used to guide the team with respect to how they would treat each other being polite, respectful and not interrupting. There were in fact no references or governance surrounding the use of the IM system. There were no guiding principles surrounding when it was appropriate to interrupt others, time to respond back, or any general guidelines with respect to interruptions. Finally, four of the seven stated that since the IP XXX service orders they were refining were so new, with many ongoing changes to the process, that they spent considerable time working and adjusting broken and dysfunctional processes. This was grossly time consuming to an already strenuous schedule. A general comment was expressed that it is important to have timely training. If training is conducted two months in advance of the new knowledge being needed, it is put into what they called cold
storage. When it is time to utilize that skill, too much time has passed and the job performer then needed to go back and find a job aid to relearn that skill.

The next question was to delve into systems and tools that the job performers had available. The question was given “With respect to tools, what worked well – what do you need – what’s on your wish list?" There were a number of internal web sites that housed a prominent amount of documented information that job performers could access if there was a need for knowledge or general updates to process. The participants felt that if the web site is designed so that they could not access the documentation that they needed in two or three clicks of their mouse, then this would discourage them to continue to use that feature. They felt that they did not have the luxury of surfing about a web page looking for information in the rapid and turbulent environment in which they worked. An interesting point came about was when one of the participants noted that in fact there were tools in the gathering and disseminating of information and knowledge. Participants felt that the only way to actually transfer tacit knowledge was via people to people contact, and there really were no other tools or systems as effective as human interaction. Finally, on-line or virtual courses would have advantages by letting them see how an application works. Participants noted that it would have to be self-paced so they could interlace it into their daily workload so that if an escalation occurred, they could readily and easily continue on the course at a later time. Again, they did feel that F2F training was by far the best solution for the transfer of explicit knowledge, particularly so for tacit knowledge.

The fourth question given was, What about leadership? (Culture) What could the leadership do to assist in Knowledge Transfer? Participants reiterated that there was a lack of resources in general within their groups, and they felt that it was the accountability of senior managers to ensure that there were adequate resources to cover the production of IP XXX orders and to cope with any overflow activities. As well, the participants felt that because of understaffing, they could not take the time away from their work to participate in concentrated, uninterrupted, quality training. It was also noted that as the IP Team continued to grow, and as the satellite offices were established,
the links back to the CoP were disrupted, and the linkages to the management were also interrupted. Job performers felt that they needed the support of management, however having positive interactions between job performers and management via virtual intercommunicating such as conference calls or, net meetings was difficult. Job performers were aware of the concerns with respect to the costs of travel, however, it was felt that there was a need for a strong staff and management connection to maintain open and honest feedback communication. They also observed that senior managers spent significant time and effort micro-managing day-to-day issues. For example, they found that senior managers were too involved with individual IP XXX orders that were under escalation. Job performers felt that they were quite competent to manage any escalations and did not need added senior manager pressures being exerted through intimidation. They felt that if management was to focus on supporting the resources, by ensuring a sound process, that this would ultimately benefit everyone, including job performers, customers, and in the end, the shareholders of this team. They noted that senior managers’ behaviors in the past were counter to the firm’s business code of conduct, and the behavior attributes that all of the employees were expected to adhere to, regardless of their position within the firm. The most disturbing perception held by some was that the behavior of some senior managers was not being dealt with by higher management. The job performers felt that Vice Presidents ignored intimidation practices used by the senior managers their teams were bringing in exceptional results. It was also important that the IP Team, being the production segment of the IP XXX, did not have the ability to disapprove of the IP process changes. The majority of participants passionately felt that it was the responsibility of the management to stand up and reject R&D products, being new processes, until the process could be released with a sense of confidence and quality. This assurance of the integrity of the products and processes would help job performers, rather than slow them down. This decrease in productivity was caused by the job performers having to cope with poor quality of information processes, causing inefficiencies and leading to order escalations.

The final question to the participants was “What about the people structure, motivation, reward system that could enable knowledge transfer?” The focus group
discussed at length motivation of people within the IP Team. Participants noted that motivation within the IP Team should be exercised with the recognition of the organic whole, versus just a small scale individual reward program that can create hostility and petty jealousy among the team. One of the participants stated “I can only be the hero if everybody else does their part right”. An example of what they felt would be appropriate individual recognition would be a co-worker or manager stating, “thanks, you did a great job” or “good work clearing up that escalation so quickly”. This reinforces the impression that time was a constraint, and a suggestion offered was to block out uninterrupted time for training and learning that would better motivate people to share knowledge in a training context. It was also noted that they felt that they were struggling with an overall genuine team attitude. One of the guiding principles of the program was to instill common best practices that would simplify and streamline the processes, regardless where in the country an IP XXX order was implemented. As the IP Team began to grow, and parts of the process were rolled out of the single R&D office to various satellite offices, the processes began to become location specific, with the local groups adjusting and modifying the process to meet local needs. This placed a burden on the body of knowledge and documentation, as one could now have many unique alterations to the process. It was felt that it was up to the senior managers to enforce the one process for all teams to use. The team felt it was important to have processes first work in the main office, with F2F relationships, before moving out into a satellite office.

5.5 Discussion and Analysis

This discussion analysis is formed by three sources of data: responses from the focus group meetings, the follow-up survey, and direct observations of the participating researcher. Focus group participants were both enthusiastic and open in discussing the questions in this environment of open and honest dialogue, and were excited to be part of the creation of an academic thesis being undertaken by one of their own.

The data from the situation within XYZ Telcom, regarding the IP Team, suggested that ensuring transfer of both explicit and tacit knowledge is best performed within a CoP,
within a single location. Also, training and the transfer of knowledge is best implemented with hands on experience, with live orders to process F2F, with an experienced and competent trainer.

While job aids are without doubt needed for the job performers for explicit knowledge transfer, they were ineffective for tacit knowledge transfer within this group. Job aids merely gave the job performer the ability to rote learn skills, or memorize routines, through repetition, however, the IP XXX process demanded highly skill job performers, with critical thinking skills, and the ability to be problem solvers as and when required. They also needed to understand the larger end-to-end processes. It was felt that understanding what lay upstream and downstream from their input, gave them the insights and tacit knowledge that influenced their decisions within their domain, and within their processes.

A strong deterrent to the successful transfer of knowledge was constant interruption from destructive distractions that the job performers endured, as well as being starved of time to do both their normal day-to-day activities and being engaged in knowledge transfer. Respondents expressed concerns that managers and leaders of groups from satellite offices were interfering and micro-managing them, as well as the local management. They felt they were expected to only do their day-to-day activities and nothing else. This reduced their motivation and capacity to effectively transfer knowledge in general to job performers.

It became evident from responses and observation that it might not be necessary to re-build every process from scratch, instead to draw on existing processes within the company that have a proven track record. Sveiby (2001) developed a knowledge transfer model that illustrated nine knowledge transfer sources occurring within and between what he calls the external structure, the internal structure and individual competencies. Organizations also have legacy systems and cultures that block this potential leverage. From an individual viewpoint, knowledge shared may be a lost opportunity if the effect
of the sharing is lost career opportunities, extra work, and no recognition of having shared knowledge.

Language was always an issue if training was not implemented in the mother tongue of the trainee. This was not uncommon, and left the resources feeling they were not grasping the knowledge as well as they could if the training and documentation was in their mother tongue. If a training course was conducted in English, and there were a number of students that spoke another language, and their second language was English, they felt that they were not gaining all they could have if the training was in their mother tongue. As well, knowledge transfer was more easily undertaken where practical and functional real life examples were also used in training and coaching in their native language.

One of the participants remarked that the members of the IP Team were in fact highly motivated and dedicated individuals, and there was a concern that if incomplete processes were pushed into the general population, there would be a reduction in productivity. Again, there was also concern with the reliability of the current processes. The type of motivation referred to was intrinsic motivation, which drives affective commitment.

In trying to understand what has happened in this case study, and trying to make sense of it, I needed to now frame the evidence gathered from the data and map it against theoretical frameworks. The frameworks discussed in this thesis and chosen to use, are the learning typology and processes offered by Prencipe and Tell (2001), and the concept of sticky knowledge (Von Hippel 1990; Szulanski 1996).

Table 5.2 illustrates some of the issues and experiences of both individuals and groups that influenced the way that this kind of knowledge was transferred.
Table 5.2 - Learning process analysis

<table>
<thead>
<tr>
<th>Context</th>
<th>Experience Accumulation</th>
<th>Learning Process</th>
<th>Comments and Case Study Sticky Knowledge and Observation Notes on Knowledge Articulation (K-A) and Knowledge Codification (K-C) through identifying Knowledge transfer enablers (K-en) and Knowledge transfer barriers (K-bar)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ind</td>
<td>On-job training</td>
<td>K-A: undertaken through structured training sessions and mentoring K-C: undertaken through developing training materials, feedback was also sought and given such as the focus group based on informal discussions between lead users and resources to develop, improve and refine training curriculum.</td>
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<td></td>
<td></td>
<td>K-en: personal motivation, the skunk works trainer concept, the firm’s leadership and implementation strategy to support the skunk works projects and the willingness to experiment and improve training and mentoring methods K-bar: initial causal ambiguity stemming from job performers not understanding end-to-end processes and the implications of their role in these processes; continual interruptions in satellite office where managers who could have made these interruptions avoidable did not and in fact micro-managed these resources; and some indications of arduous relationships and a barren organizational context in satellite offices.</td>
<td></td>
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<tr>
<td>Ind</td>
<td>Learning by doing, using, reflecting, and confronting</td>
<td>K-A was undertaken by reflecting, thinking, discussing and confronting real-life examples thinking ahead of how best to successfully replicate and adapt processes to meet the needs of local demands and situations (context). K-C was undertaken by learning and writing these processes down (for explicit knowledge) as job aids and transferring tacit knowledge through adapting these processes and building a repertoire of routines using groupware technologies to record solutions to questions posed by colleagues.</td>
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<td></td>
<td></td>
<td>K-en: lead user job performer groups having a leadership culture within the firm to encourage them to incorporate real life examples in training exercises so that they rehearsed these routines prior to fully implementing the processes. These examples were designed to confront and challenge job performers to learn. K-bar: revolved around the same issue as noted above for training.</td>
<td></td>
</tr>
<tr>
<td>Grp</td>
<td>Imitation and</td>
<td>K-A: verbal F-2-F interactions with resources and trainers; brainstorming sessions in the head office or conference calls; various</td>
<td></td>
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<tr>
<td>routines</td>
<td><strong>ad-hoc</strong> and scheduled feedback meetings.</td>
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<tr>
<td><strong>K-C</strong>: developed written (paper notes and electronic notes as emails, IMs, etc) routines and protocols that followed a broadly repeatable formula with deepening histories of context and workaround strategies</td>
<td></td>
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<td></td>
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<tr>
<td><strong>K-en</strong>: lead user job performers become the initiators of evolving best practices as illustrated in the Crossan, Lane and White (1999) and Lawrence, Mauws, Dyck and Kleyser (2005) feed forward/back knowledge transfer and influencing theories. There is clear leadership commitment to changing the culture of satellite offices to adopt the best of the culture of the skunk works unit. Some evidence of post mortems and gathering lessons learned.</td>
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<td></td>
</tr>
<tr>
<td><strong>K-bar</strong>: under-resourcing and frustrations relating to uninterrupted time to fully codify knowledge or explicate current tacit contextual implications of practical application.</td>
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<tr>
<th>Grp CoP and culture</th>
<th><strong>K-A</strong>: members using a CoP within the head office location to meet and exchange ideas and suggested improvements. Mainly verbal and demonstrated examples of knowledge to be transferred with use of technology such as groupware applications.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>K-C</strong>: Notes and messages, individual’s memory and developing CoP electronic knowledge bases.</td>
<td></td>
</tr>
<tr>
<td><strong>K-en</strong>: Full leadership support within the skunk works. Member’s keen motivation and passion, sense of excitement about being industry pioneers, fear of losing out to competitors as highlighted by Schein (1993) in his theory of these two types of anxiety influencing change behaviour and motivation to take certain actions.</td>
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<tr>
<td><strong>K-bar</strong>: Satellite office bureaucratic history and their managers’ lack of willingness and ability to be open to challenges by job performers as acknowledged by the CEO in the XYZ Telcom 2004 annual report. This inertia undermined rolling out the CoP’s from the head office skunk works location. Dual language discussions for some participants.</td>
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</table>

An additional driver and barrier to knowledge transfer, that was not evidenced in the table listed above, was the paradox of the organization’s history. As a traditional telecom firm, it was still burdened by its previous monopolistic status, that insulated it from radical change and market competition, and this was reinforced by its highly bureaucratic structure and organizational culture. Telecom firms, however, have well established R&D divisions, and so also have a high capacity to capitalize on their strong absorptive ability (Cohen and Levinthal, 1990). These firms need to diffuse this capacity beyond the
R&D divisions that were accustomed to developing new products to the wider organization, to embrace new service and process approaches that result in radical changes in speed to market and customer relationship performance.

A major barrier, found to be triangulated by observation of the researcher, focus group discussions and the follow-up survey, was the disruptive nature of process escalations on job performers in their training and testing of novel processes, and micro-managing leaders in satellite offices where these new processes were being rolled out. This fits with what Szulanski (1996) referred to as the arduous sticky knowledge factor relationship between source and recipient. It can be explained in the holistic concept of man’s notion of the interplay between consciousness, situationality and corporeality (Koskinen and Pihlanto, 2006). Consciousness may have been partially impaired because of the job performers not fully understanding the end-to-end process implications of their role, and some of them occasionally found language a barrier, and some experienced problems in dual-language discussion groups. Corporeality aspects intruded in the sense that the job performers felt constrained to transfer their attention to escalating a production order when required to do so by micro-managing satellite office managers. The situation that they found themselves in was one where they felt overworked and under-resourced, and this affected their ability and motivation to share knowledge at times, and also the issue of rewards and recognition was raised which concurs with Szulanski’s (1996) arduous relationship stickiness factor. Using the Prencipe and Tell (2001) approach to analyze the learning landscape, the case study experience suggests that the skunk works exhibited characteristics of being knowledge explorers with a strong top-up approach to bring R&D resources together with lead users developing innovative new processes, and they were also a knowledge exploiter in attempting to roll out knowledge and experience from the skunk works to the broader organization.

The skunk works approach that XYZ Telecom pursued is consistent with that argued by Artto, Martinsuo, Dietrich and Kujala (2008) as being appropriate for a business transformation project, and they suggest success can be measured by the way that this
project contributes to developing new businesses, radically new products or services, and speed of extracting itself from decaying markets or product support.

For readers of this thesis, I suggest that it provides a real life story that has been distilled into a useful case study and my analysis goes some way to explain the ‘why’ issues, why the results observed may have happened in that way.

Table 5.3 - Linkages between sticky knowledge and case study results

<table>
<thead>
<tr>
<th>Stickiness Source</th>
<th>Brief Description</th>
<th>Case Study Result</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Source lacks motivation</td>
<td>LOW Leadership and motivation issues (see Section 4.2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 Source lacks credibility</td>
<td>LOW Leadership in establishing purpose and vision and through developing trust (see Section 4.5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 Recipient lacks motivation</td>
<td>LOW Enthusiasm and commitment (see Sections 2.7.3 and 4.1)</td>
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<tr>
<td>4 Recipient lacks absorptive capacity</td>
<td>LOW/MEDIUM People selected and identified as being key talent in this area and for being enthusiastic and committed (See Sections 2.7.3 and 4.1), however, their multitasking habits inhibits them from absorbing knowledge</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 Recipient lacks retentive capacity</td>
<td>HIGH Distractions of technology overload</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 Barren organizational context</td>
<td>LOW Sound governance and empowerment of people</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7 Arduous relationship between source and recipient</td>
<td>MED/ HIGH Technologies were disruptive see explanation below</td>
<td></td>
<td></td>
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</table>

Table 5.3 illustrates the knowledge transfer approaches adopted and reflections of those participating in it to unearth what appeared to work. Knowledge transfer appears to have been effective, although I identified some real and serious barriers. If one uses Szulanski’s (1996) seven factors of stickiness, one can see that both sources and recipients of knowledge transfer were highly motivated and credible so these form enablers rather than barriers. The recipients did not lack absorptive capacity. The
organization’s leaders strongly supported training and development, and the R&D experience facilitated it to build absorptive capacity in its staff. The recipients generally did not lack retentive capacity except when overworked, and the attention overloaded, through destructive distractions and the frequent crises that they had to manage. In general, there was little evidence of an arduous relationship between source and target and the organizational context was not barren.

The main problems emerged when recipients became a bottleneck during the rollout of the innovative. As stated and observed, these people appeared to be overburdened with work preventing them from receiving training required to perform at their potential level. Their suggestion was to increase the number of job performers, so that those undergoing training and participating in knowledge exchange with those refining the new processes have sufficient, undisturbed time to internalize tacit knowledge. This may be a common and obvious solution, and it should be heeded if XYZ Telecom is to effectively roll out the new process and new work culture.

The difficult part of this process becomes clear from the analysis that the broad organizational culture change project is a mammoth task, however, lessons from this process innovation rollout indicate that many of the factors affecting stickiness of knowledge transfer including knowledge about how to change the culture are favorable, and that perhaps through careful training and development, and using some of the approaches successfully used as illustrated in Table 5.3 above, the organizational context can become less barren and the relationship less harassed, strained and pressured.

5.6 Summary

This chapter has given details upon an investigation of a case study situation and given a better understand into how knowledge was transferred relating to the process re-engineering rollout example that formed the focus of this exploratory study. I used a single case study and justified this as being appropriate to the case, as it is an extreme example (Yin, 1994) of change being instigated through a skunk works organization, segregated from a large bureaucratic legacy organization. I confined the study to
knowledge transfer between developers of an innovation and the new production ordering process, and those charged with carrying out that administrative task in the broader organization. I used the theoretical framework offered by a number of KM and OL theorists, and more specifically, adapted ideas about learning processes (Prencipe and Tell, 2001) and sticky knowledge (Von Hippel 1990; Szulanski 1996) to help make sense of what was discovered to be the live experience of those interviewed, and the participating researcher associated with this vanguard project. I was now faced with a ‘so what’ question. What use is this understanding to the organization and readers of this thesis? This question will be addressed in the following chapter.
Chapter 6 - Knowledge Management Overlay Model

6.0 Introduction

Chapter six presents the knowledge management overlay model. The recommendations have been derived from the research, reflections upon observations from 25 plus years of personal facilitation, and deep reflection on the topic of knowledge transfer, and are supported by findings presented in Chapter 4 and Chapter 5. This chapter will directly address the problem of resolving an ill-defined problem, such as functional or non-functional requirements, from a system development and project management perspective. The chapter starts with a discussion on the knowledge transfer model in a practical, real world setting. The chapter argues that barriers to successful knowledge transfer are most severely impacted by destructive distractions in varied forms, such as multitasking, the use of acronyms and the limitation of domain knowledge, the language that we use, as well as enablers of knowledge transfer such as CoPs, senior management support and uninterrupted knowledge transfer. The chapter then focuses on a discussion of the KM model environment and a number of enablers and barriers to knowledge transfer within a business setting. This thesis is based within a business environment. The chapter goes on to discuss the concept of “radical co-location” as being a particularly positive influence on knowledge transfer.

6.1 The Knowledge Transfer Model in Practice

The knowledge transfer model discussed below is relevant to project management methodologies, as well as being overlaid onto a systems development life cycle methodologies, that are currently being utilized, from the traditional waterfall methodology, to the extreme Rapid Application Development (RAD), Spiral Development, and Extreme Programming (XP) to agile software development. I argue that the knowledge transfer model can also be applied to most projects from process improvement projects, new product or solution introduction, to technological innovations and software and hardware development. The goal of the knowledge transfer model is to
ensure a clear and concise transfer of requirements knowledge, from inception of the original business requirements, through to the functional product that is presented to the end user. The goal is to maintain the fundamental traits and characteristics of the requirement through the entire process that currently is lost during the transfer of knowledge. The objective of the knowledge transfer model is to consistently transfer knowledge from person to person, team to team, and from one functional department to another. Additionally, the model will maintain the holistic knowledge that is acquired from the customer or end user in the form of a business requirement, which is then transformed to a functional and or non-functional requirement to technical project requirements, and through the entire life cycle of the requirements management process. The customer and or end user are to be considered the consumer of the final product or solution. The ultimate goal of any Information Technology (IT) development project, or any project, is to ultimately present the final product or solution that the customers or end users truly want and will in fact use. This progression starts with and requires the customer or end user’s input at the front end of such a process or project.

Table 5-3 in Section 5.5 presented an evaluation of the specific barriers to knowledge transfer, therefore stickiness, for this case study. It uses the Szulanski (1996) model that was later extended to show how to avoid knowledge stickiness (Szulanski and Jensen, 2004). Figure 6.1 illustrates the elements of knowledge stickiness in the context of this study and how the problem of knowledge stickiness impedes effective transfer of knowledge relating to system requirements for IT development projects.
Figure 6.1 - The sticky knowledge transfer model – what to avoid

The Figure 6.1 model provides an illustration of results from the study that shows four specific issues that hinder knowledge transfer. It illustrates how effective knowledge transfer involves more than just identifying, analyzing, and understanding what the end users’ requirements are; it is about being able to clearly and intelligibly transfer that
knowledge from the user through to the project and process teams, through to the technical teams, the training teams and ultimately the support teams. The ultimate goal is to iteratively return to the end user with their initial knowledge intact.

I will illustrate an example from my experience and typified in the kinds of developments prompted through the case study organization XYZ Telcom presented in this thesis. A radically new process to meet customer expectations may be initiated through customers and/or the organization’s marketing department. That knowledge about the rationale why and how to go about delivering this potential radically improved process could then be passed to an engineering or to a project delivery team sector to make that improvement function. This could involve a project change management team comprised of software technical teams, business analysis, systems analysis, developers, testers, document specialists, trainers, rollout delivery teams, and the final support team. Throughout this process, knowledge is being created, transferred and in some cases, reframed. Some knowledge is retained, some can be discarded, and much of that discarded is of value because of some of the earlier knowledge in the chain that could be re-used and re-framed somewhere later within that chain. Knowledge loss and re-work through inefficiencies of that knowledge loss can represent substantial cost wastage which is regrettable, and more importantly, in projects with a rapid time to market objective, that lost time is a critical factor determining perceived success of the change project. Once implemented within the project teams, a knowledge transfer model, such as that suggested through this thesis, will reduce the alteration of knowledge content pertaining to, and required for, successful and timely process or product changes. This is due to knowledge that is created, transferred and reframed, will have accomplished a more effective requirements to delivery cycle with a minimal loss of content to effectively manage that change initiative.

Figure 6.2 illustrates how a new ICT initiative project progresses through a life cycle within the case study organization XYZ Telcom.
All ICT projects in this organization start with an identified customer(s) need. A customer has a need or a requirement for a product, service, or a positive result or benefit, through the improvement or a product, administrative delivery process, or system. In a number of cases, a project is created to solve a customer problem or opportunity that the customer may not have had in the past or may experience in the future. This is almost inevitable when IT components of systems are migrated from legacy systems to integrated or updated systems. Often in other situations, customers have a new idea of how an existing working system could be improved to make them more productive. In numerous cases, the customers or end users do not know what the final product or solution will look like upon completion of the change or system migration. They do not know what functionality the product or solution will have or even need. The end user may identify that they have a problem to resolve. As the end users describe their problem, they are in fact articulating a business requirement. A business requirement is the first of many conversations between customers and change initiators surrounding the
numerous types of customer or end user requirements, and the beginning of the knowledge management model as depicted in Figure 6.2.

A business requirement is articulated by the customer or end user describing in his or her words, the needs that he or she has or the problems that are faced with that need to be resolved. The requirements in this early state are only useful for the customer’s general understanding, and are later modeled into more formal functional and non-functional requirements that the technical teams work with to create their specifications. The business requirements are expressed in the customer’s own words, in terms that they normally use and understand when attempting to explain and articulate their needs. In many cases, it is the job of a Business Analyst (BA) to successfully extract the customer’s requirements. Unfortunately, often the customer or end user commonly cannot effectually articulate to the BA what it is they want or need. The customers or end users may only be able to tell the BA what gaps they have in their current process or solution, those things that make their work difficult, and it is then up to the BA to understand the need, translate and transform this limited information into a tangible requirement. Once the requirement(s) is presented from the end user to the business analyst, and documented by the BA, the knowledge management model is initiated. As seen from the knowledge transfer model illustrated in Figure 6.1, there are numerous potential gaps in this process, where knowledge can be lost, distorted or misinterpreted.

In this description of the Knowledge Management Model, the end user or customer will be referred to as the interviewee, and the business analyst will be referred to as the interviewer, unless stated otherwise.

6.2 Destructive Distractions that Inhibit Knowledge Transfer

This section refers to Figure 6.1, the sticky knowledge characteristics, to highlight some of the disruptive and destructive distractions that were identified through the XYZ Telcom case study results presented in Chapter 5 that cause the problems identified by the thunderbolts in Figure 6.2 (Szulanski and Jensen, 2004). The following subsections
highlights examples that were experienced and observed while embedded within the organization, and they are based on data gathered during the study. The author relates them to existing theories to explain their relevance to the model of knowledge transfer the author has developed.

6.2.1 Distractions through Multitasking

We live in the age of modern applications and communications devices that are used to keep us in constant communication with others instantaneously. Smart devices, as they are called, such as the Palm® Pre™, Apple® Iphone™ and the BlackBerry®, give users access to email, instant messaging and internet access, just to name a few of the many applications and functionality imbedded in these communications devices. From a business perceptive, the premise is to keep the user in contact with the office and all of their work activities, no matter when or wherever they are. As an email is received on the device, it vibrates to identify to the users, and the user is then able to access the email and any attachments or pictures immediately. These devices are becoming exceptionally popular, and it is unusual to be in a meeting or conference today without most people carrying this type of device and staying connected to the home office. This device gives the illusion that the user is able to multitask, such as attending a training session on time management and sending emails to their boss in the office simultaneously. The enigma is that humans cannot effectively multitask. Humans can time slice, or as Crenshaw (2008) labels it, switch tasking, however, humans cannot effectively multitask, meaning they cannot successfully do two or more activities concurrently.

This is similar to the concept raised by Miller (1956) that there is, as he calls it, a magic number of seven plus or minus two of things that people can hold in their head at any one time. This work of Miller’s sparked much research into the problem of information overload (O'Reilly III, 1980; Huber, 1991; Hahn, Lawson and Lee, 1992; Farhoomand and Drury, 2002) as discussed in Section 2.8. Information and sensory overload limits the capacity for humans to effectively perform. Time slicing is the description of attention that is given to one task that is interrupted, and then the receiver moves to
another unrelated task. There is a cost associated with time slicing. If the receiver is having his or her attention, or thoughts or energy, engaged on a task that uses mental capacity, such as reading a project charter, subsequently he or she receives an email that interrupts the project charter task, and he or she does in fact divert attention to reading the incoming email, there is a clear change of focus, and this has a negative effect on productivity and focus from the original task. When the human then goes back to the original task, in this case the project charter, there is time needed to get go back and review what has done before resuming the task. This is a cost to their productivity and focus. In the busy lives of most business people today, interruption is a constant fact of the business world. If the time lost is 15 seconds, and one diverts one’s attention from one task to another 125 times in a working day, there is a loss over half an hour of productive time refocusing attention to an original task, and as task complexity increases, or the importance of the task intensifies, the time to refocus increases.

Some of the more common interruptions observed in this study include colleagues stopping to talk about unrelated topics, leaving the work area voluntarily, arrival of email, switching tasks to taking phone calls or writing out a reminder on a piece of paper. (Crenshaw, 2008). According to Crenshaw (2008), the average lost productivity per person that is due to an interruption alone is 2.1 hours per 40 hour work week. All of these distractions and interruptions force the person to refocus, as he or she moves from task to task. As the tasks become more and more complex, there is an inverse relationship making the user increasingly less effective and productive. With complex tasks, such as approving a project charter and addressing critical emails, switching back and forth from one to the other does have complexity, versus a non-complex task, such as driving a car and eating, which amounts to two rote skills happening simultaneously. A rote skill is one that is memorized through repetition and requires minimal processing capacity and attention to manage. Many of the skills required to be learned by BAs and PMs call for far more intensive concentration on reasoning learning than would be the case for mere rote skills.
With respect to transferring the knowledge of user requirements, this is considered an extremely complex and critical task that will need to be restarted and reset if the human diverts his or her attention to another task. We cannot effectively multitask complex tasks. If humans multitask, they are reducing their efficiency, effectiveness, productivity, and reducing the transfer of knowledge. In this day and age, with the amazing and convenient tools to stay connected with home, the office, and family, and the internet available, it is easy to become inundated with one or two hundred emails a day. Some of this excess of information and emails have value, and some have little or no value. Each time our attention is pulled from one task to another, there is an inherent loss of productivity and focus.

6.2.2 Confusion Caused by Using Acronyms

In relation to the role of acronyms as noted in Section 2.9, in communication problems, acronyms can contribute to a barren organizational context (sticky knowledge factor 6 in Figure 6.1) through creating unease or discomfort in knowledge exchange.

Many project managers and systems analysts work on projects that have complexity well beyond their domain of knowledge. Complexity takes on many forms. It can come from the structure of components of a system, the degree and type of interactions, the number and type of people to be interact with, timing and level of iterative interaction, as well as the level of uncertainty about what is to be done and how it is to be achieved (Remington and Pollack, 2007; Remington, Zolin, and Turner, 2009). Project managers and project team members deal with complex systems, software and technologies that a single person could never be convergent on all of the theories, presumptions and assumptions, and more importantly, the language associated with the domain. This language that is associated with the domain in turn is saturated with what seems to be endless acronyms that the project manager, systems analyst and project team members may not be familiar with, and are then left not knowing what the acronyms mean, or must research the origin of the acronym, with varying degrees of success. In many cases, the project manager or systems analyst is not familiar with the terms and language of the domain and the
acronym leaves the receiver with a blank space in a sentence as presented in Section 2.9. As well, the receiver may misinterpret the acronym and feel that they do understand the term, when in fact, they have a false understanding as they have misconstrued the acronym. This can also have a negative impact on sticky knowledge factor 3, illustrated in Figure 6.1, as it makes it difficult for knowledge recipients to absorb knowledge through any exchange, where confusion may arise from the meaning of terms used, or the correct interpretation of the acronym.

Following is an example that can be consistently used with presentation material, training material and project documentations to remove the confusion of misinterpreted acronyms. If organizations mandate this method consistently with all of their documentation, the misunderstanding of the domain language and the various acronyms within them are made known publicly, and this information, which was previously known only to a few experts in the field, is transferred to all receivers of the information clearly and accurately. This also takes away the feelings from the receiver of feeling silly and having to interrupt a presentation or training session to ask the question what does that acronym mean? When people do in fact ask what an acronym does stand for, many others in the room have the look of oh, that’s what that means. The example below is a document used for a presentation with the acronyms plainly listed in the footer that enables knowledge transfer during the training session, as well as for later reference. This adheres to the principle that both sender and receiver should share a mutual understanding of statements made or exchanged for clear communication to have occurred.
Example 1

The reason is that most people active in the IEFT expect ATM to be solely a WAN solution, and maybe the WAN solution presenting the backbone of a future Internet, but ATM will never make it to the desktop in their view.

Internet engineering Task Force (IEFT) a large open international community of network designers, operators, vendors, and researchers concerned with the evolution of the Internet architecture and the smooth operation of the Internet.

Asynchronous Transfer Mode (ATM) A dedicated-connection switching technology that organizes digital data into 53-byte cell units and transmits them over a physical medium using digital signal technology.

Wide Area Network (WAN) WANs are networks that span the distance between buildings, cities and even countries. WANs are LANs connected together.

This clear definition of nomenclature and terminology can also be used in all technical documents. This enables clear knowledge transfer during training sessions as well as being a useful resource for trainees to access for later reference. The ultimate objective is to ensure that the receiver truly understands the language and content of the sender. Acronyms that are not understood by the sender have zero value, and are in fact just noise to the receiver, with little to no knowledge transfer. This also applies to the language of the domain that the sender needs to be cognitive of, and ensures that he or she is not using wording that can have little or no meaning to the receiver. A well planned out training session, or information exchange, with the sender being aware of these issues of knowledge transfer, will enable the successful exchange of knowledge in that context.

Another damaging effect regarding acronyms is that the letters of an acronym can have numerous meanings. As an example, a Business Analyst is commonly referred to as a
BA in most North American organizations. After a search in an active acronym database, the results pulled 132 definitions of BA (Acronym Finder, 2009). Not only did the acronym define the Business Analyst, it also defined a number of other examples. Following is a limited list of those results:

- British Airways
- Bachelor of Arts
- Barium
- Bank of Austria
- British Academy
- Billing Address
- Business Agent
- Bell Atlantic
- Build Assessment
- Budget Analysis
- Basic Allowance
- Binary Add
- Botrytis Affected
- Build and Acquire
- Ballistic Aggregation
- Buoyancy Aid
- Buffer Amplifier
- Benefits Administrator

This is a small sample of the 132 definition for the acronym BA. These are all applicable and valid results for the BA acronym. If the acronym does not have at least at a minimum some contextual reference associated with it to understand what domain in which it applies, the acronym becomes an inhibitor to the successful transfer of knowledge. The full results of the full search can be found in Appendix J.
Technical and or social jargon is considered the characteristic language of a particular group of a domain. Specialized work groups tend to create their own subculture with its own language and sets of meanings, that is rooted in the context of that subculture in a way that tends to exclude out-groups or individuals not part of that culture (Schein, 2004). Technical or social jargon can also be a strong disruptor to the successful transfer of knowledge where there is an imbalance of context knowledge that allows sense to be made of such language.

Acronyms that are organizational unit specific and technical jargon are particularly disruptive to a new employee who is attempting to learn and understand his or her new role in the organization. Not only is there the discomfort of a new environment and new people to be working with, there is often the additional challenge of not being able to understand what is considered internal to the organization, the common language. It is not only difficult to understand, it quickly becomes frustrating for the new employee.

Additionally, employees who move from one department to another within an organization, and hold their own technical or social jargon from their home department, are also limiting from a clear knowledge transfer perspective. The difficulty lies in moving information from one subgroup within an organization to another. Jargon, is the French word for the twittering and chattering of birds, and has since been described as meaningless talk and or gibberish (Carr, 2006). As with the example of the paragraph with the acronyms replaced with an asterix symbol shown in Section 2.9, if jargon words are not known to the receiver they are in fact blanks in the sentence that leave the receiver struggling to fill in the blanks as best they can.

As argued by Lindsley (1991), technical jargon is best replaced with plain language. By using a subject, verb, object format, the jargon sentence can be transformed into a more manageable statement. In areas such as the pharmaceutical industry and the technology industry, such as networking, telecommunication and computers, technical jargon is rampant. As put forward by Lindsley (1991), it is important to listen to the existing practitioners of that organization to gain the full understanding.
For the knowledge transfer model, as with acronyms, the technical jargon needs to be spelled out in plain language on all documents. In face-to-face discussions, all jargon can be explained to the receiver to the level of detail required. The sender must become aware that receivers can be reluctant to ask what does that mean, making the sender the controlling entity in this transaction. It is the responsibility of the sender to ensure that the knowledge is in fact transferred. When in doubt, use plain language. Technical and social jargon is a disruptor to the successful transfer of knowledge, and needs to be managed with plain language exchanges.

Domain knowledge is knowledge that is routinely used in the work environment or any walk of life by people, be they employees or SMEs, to complete their work activities. Alexander (1992) describes domain knowledge as having declarative knowledge, procedural and conditional knowledge. Declarative knowledge is the knowing that and procedural knowledge is the knowing of how. One’s domain knowledge will encompass this environment and certain specific terms, acronyms or jargon will be exclusively anchored to the context of that domain. A person may be well versed in the norms and customs of his or her culture and the profession, and in the case of the author for example, these relate to the tools and techniques of project management.

However, people also acquire additional domains of knowledge such as being a parent or one with exceptional leadership and communications skills. In doing so, they must remember the meaning for similar or identical terms in the various knowledge domain contexts. With respect to knowledge transfer, as they move into a domain of knowledge that they are not familiar with, the knowledge transfer process can become demanding and complex to them as the receiver, and difficult to be successful. As a competent project manager, they may be given a project that necessitates the creation and documentation of a business requirement document that articulates the end users’ requirements of a financial management project. The common acronym, that they have become accustomed to, such as BA for business analyst in this new world, may in fact not be that of a business analyst, but instead may mean Budget Activity. Project
managers, in this example, must be aware of the difference in domain knowledge and acronyms from the various subgroups they work in, and ensure that they in fact truly understand the meaning.

6.2.3 Distraction from Internet, Intranet and Extranets Page Design

The internet, intranet and extranets are all mediums of communication that have arisen in the last 30 years from a humble beginning to now being the cornerstone of global communications. The internet usage statistics state that 1,668,870,408 users that are online as of June 2009.

Table 6.1 - World internet usage and population statistics

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Africa</td>
<td>991,002,342</td>
<td>4,514,400</td>
<td>65,903,900</td>
<td>6.7 %</td>
<td>1,359.9 %</td>
<td>3.9 %</td>
</tr>
<tr>
<td>Asia</td>
<td>3,808,070,503</td>
<td>114,304,000</td>
<td>704,213,930</td>
<td>18.5 %</td>
<td>516.1 %</td>
<td>42.2 %</td>
</tr>
<tr>
<td>Europe</td>
<td>803,950,868</td>
<td>106,096,093</td>
<td>402,360,474</td>
<td>50.1 %</td>
<td>282.9 %</td>
<td>24.2 %</td>
</tr>
<tr>
<td>Middle East</td>
<td>202,687,005</td>
<td>3,284,800</td>
<td>47,964,146</td>
<td>23.7 %</td>
<td>1,360.2 %</td>
<td>2.9 %</td>
</tr>
<tr>
<td>North America</td>
<td>340,831,831</td>
<td>108,096,800</td>
<td>251,735,500</td>
<td>73.9 %</td>
<td>132.9 %</td>
<td>15.1 %</td>
</tr>
<tr>
<td>Latin America/Caribbean</td>
<td>686,662,468</td>
<td>18,066,919</td>
<td>175,834,439</td>
<td>30.0 %</td>
<td>873.1 %</td>
<td>10.5 %</td>
</tr>
<tr>
<td>Oceania / Australia</td>
<td>34,700,201</td>
<td>7,620,460</td>
<td>20,830,019</td>
<td>60.1 %</td>
<td>173.4 %</td>
<td>1.2 %</td>
</tr>
<tr>
<td>WORLD TOTAL</td>
<td>6,767,805,208</td>
<td>390,985,492</td>
<td>1,668,870,408</td>
<td>24.7 %</td>
<td>362.3 %</td>
<td>100.0 %</td>
</tr>
</tbody>
</table>

NOTES: (1) Internet Usage and World Population Statistics are for June 30, 2009. (2) CLICK on each world region name for detailed regional usage information. (3) Demographic (Population) numbers are based on data from the US Census Bureau. (4) Internet usage information comes from data published by Nielsen Online, by the International Telecommunications Union, by GIK, local Regulators and other reliable sources. (5) For definitions, disclaimer, and navigation help, please refer to the Site Surfing Guide. (6) Information in this site may be cited, giving the due credit to www.internetworldstats.com. Copyright © 2001 - 2009, Minkoff Marketing Group. All rights reserved worldwide.

The statistics presented in Table 6.1 are only indicative and do not include the myriad of private intranets and extranets that are considered restricted to internal businesses that are internet-based communications solutions. End users of communication have to adapt to these new intellectual technologies for communication and knowledge transfer. The
internet, as a communications tool, has exerted a broad influence over our thoughts and has become a confusing and exceptionally distracting communications tool that scatters our attention and diffuses our concentration (Carr, 2008). The internet has not only influenced humans as end users, it has also influenced the way other communications mediums are conducted. Using the internet to surf for information takes the end user to countless flashy web sites with distracting blinking alerts, videos, sounds, links to other web sites, moving pictures, flashing lights, rolling banners, adds or links that continually refresh the web page giving additional new information, blinking advertisements, and scrolling text. The viewer is inundated with visual information and audio. As noted in Section 5.4, users are not willing to move more than two or three mouse clicks to find the information they require. Figure 6.4 is the home page of the New York Post dated August 27, 2009, and is considered a typical web site containing information an end user could seek out for news from New York.
Figure 6.4 - Home page of the New York Posted August 27, 2009
Figure 6.4 is a representative example of an extremely distracting and visual communication tool that appears to be created to drive the end user away from his or her original intent to another distraction. In Section 2.7.5 the author discussed communication theory, and this example does not comply with principles stated in that section that highlight what effective communication should consider. The end user accessing the web site is pulled away from what he or she may originally have been searching for and moved to a distracted topic that although possibly is an interesting subject to the end user, it was not the original topic required.

This particular form of distraction has also moved into the traditional mainstream communications media where television news channels now have scrolling news bites moving from left to right across the bottom of the television screen as well as an open box with a newscaster reading the news headlines. If the viewer begins to read the text they can no longer absorb the verbal dialog, again there is a cost to task switching. News channels have multiple screens of text and information within the viewing field of the receiver all used to distract the receiver. Similarly, hard copy newspapers and magazines are now shortening their articles and introducing capsule summaries and crowding their pages with information snippets to pull the reader to distraction and move them to read text that they would otherwise not have been researching.

With all of this disruption going on within these web sites and television, and the printed news articles, the premise is to draw the viewers away from what they intended to seek out and stimulate them into viewing additional information, or in the worst case, the advertisements on the owner’s web site or television channel. Again humans cannot multitask and need to focus on one task or topic at a time. If not, they reduce their productivity as described in Section 6.2.1.

As text crawls across the bottom of the screen of a television channel or web site, if they chose to read the content, they can no longer effectively take in the audio until something from the audio catches their attention and pulls them from reading the text. Once they have moved from the text to the audio they no longer consume the information from the
text. This is an ineffective method to assimilate information; at best the receiver is gaining only limited data from a number of concurrent streams of information. In the case study, I observed that during training sessions where instructors had been using rooms with wireless access to the internet, many participants were actually periodically accessing news sources or other web sites of interest on their wireless laptop computers, such as the page illustrated in Figure 6.4, and so they were further distracted from the purpose of the training session and any workshops or other knowledge exchange meetings where this phenomena also occurred.

6.2.4 Distractions from the Learning Environment Factors

The learning environment can also have a positive or negative influence on the successful exchange of knowledge transfer. The learning environment includes both the physical environment for the sender and receiver of information, as well as the technologies and equipment required for the transfer of knowledge. Mackeracher (2004) argues that as the facilitator of knowledge exchange, one needs to think critically about the learning environment and circumstances before they become problematic. Data gathered through the author’s personal observations, being a participant in the action learning process as a trainer and facilitator of knowledge transfer and through interviews, highlighted the impact that the learning environment has on the organizational context (Factor 6 in Figure 5.3) and how it affects, and can introduce, an arduous relationship between knowledge source and recipient (Factor 7 in Figure 5.3).

In Section 2.7.7, the importance of environmental comfort was discussed as an important consideration in designing a workplace layout and facilities to motivate learning and knowledge exchange. The learning environment surroundings should include comfortable chairs and tables free from placing knowledge recipients within a stressful and distracting atmosphere. If the sender or receiver of information is uncomfortable and or distracted by the chair and or table, this pulls his or her thoughts away from the incoming information. This becomes a destructive distraction. Room lighting, being too bright or too dim, the temperature of the room being too hot or too cold, or open windows
with outside activities causing noise or a visual distraction can quickly become a destructive distraction and pull the senders’ or receivers’ attention away from their objective.

Many modern conference rooms in the twenty first century have windows that overlook busy streets with pedestrian and vehicular traffic passing by. Figure 6.4 illustrates a critical incident that forms part of the case study data in this thesis. While attending a senior-level video conference, a receiver noted that there was a person outside of the conference window taking a cigarette break. The person could not see into the conference room because of the one-way glass. This person went on to spend the next 15 minutes pacing back and forth and then stopping to lean on the very glass of the conference room for a couple of minutes while smoking the cigarette. The distraction was almost debilitating to the receivers in the conference room, as the person smoking became the attention of all of the participants in the conference room. This situation brought the exchange of knowledge to a complete stop, see Figure 6.5. Figure 6.5 also shows one receiver being distracted by using their smartphone to send and receive text messages.

Figure 6.5 - Visual distraction
There are also a number of subtle distractions that cause an obstacle to attention within a conference room setting such as lights that are flickering or whiteboards full of unrelated text. In the case of a flickering light, this can be resolved by replacing, or at minimum removing the light. Whiteboards or pad boards with non-related information, not being on the topic discussed, may inadvertently be left from past meetings. In the case of a conference room that has been previously used, a whiteboard or pad board may be full of financial information on the corporate strategy that is not relevant to the next session or an unrelated process mapping session.

Figure 6.6 - Whiteboard with unrelated data

This will be a distraction to the receivers of the next session if it is not removed, as they are distracted by trying to decipher the context of this unrelated whiteboard information.
Another important aspect, from an environmental perspective, is co-location. Sometimes called extreme or radical co-location, this concept sees a team, such as a project team, brainstorming session or training session being completely conducted in a face-to-face environment. With the onset of modern tools such as video conference rooms, as well as conference calls and net meetings, full-functionality interactive Web-based desktop video conferencing, to next generation video walls with stereo sound, corporations are moving away from many face-to-face meetings to reduce the costs of travel to the organization, as well as the lost productivity to participants. Teasley, Covi, Krishnan and Olson (2000) argue that many projects fail, or are over budget and have schedule delays, because of the communication delays and breakdown since they do not have co-located team members.

Figure 6.7 - Radical co-location

Figure 6.7 illustrates a radical co-locate of a large team. The Teasley et al (2000) study also illustrates that organizations are looking to co-locate the entire team for the duration of the project to reduce the communication collapse. Their research measured productivity, satisfaction, attitudes and use of time. Their results found that a co-located team, mostly software programmers, produced double the number of function points, being the unit of measurement of business functionality an information system gives the end user per staff month from the previous baseline month for the company. This is an
astonishing result. For the software programmer to be successful in creating functional
code one spends less than 20% of his or her time actually coding and less than 30% spent
on traditional programming tasks. The other 50% is spent in meetings, problem solving
with the team, resolving customer issues and product testing. It is these tasks that require
the successful exchange of knowledge through direct and quickly convened
communication channels. As well as this being an enabler to knowledge transfer, co-
locate paradoxically decreases privacy, quiet and in some cases, concentration levels, so
it also presents a barrier to knowledge exchange. However, face-to-face interaction
provides participants with immediate information and as well as any immediate attention
can be directed to changes to requirements, as well, face-to-face interactions let the team
members physically interact with each other at the moment relevant information is being
transferred (Mark, 2002).

Finally, from an overall environment perspective, data gathered in this study suggest that
there needs to be an overarching team charter, as well as a vision to guide the behavior of
the team members and to provide a clear purpose for the project. This is supported by
best practice suggested in the literature (Christenson and Walker, 2004; PMI, 2004). The
team charter sets out the rules of engagement between team members, guides the
expectations and accountabilities for attending meetings and the behavior members will
adhere to as described in Section 5.4. Possible items within a team charter that were
identified from the case study to be included:

- Come to all meetings on time.
- Meeting starts on time.
- Always come to the meeting prepared to address agenda items.
- The facilitator controls the meeting.
- Each team member will treat all other team members with respect.
- Communication is open and honest.
- Everyone has the opportunity to speak.
- There are no silly questions – if you need to ask a question for
clarification, others need the clarification as well.
• No multitasking (laptop, cell phone, instant messaging)
• No side conversations.
• State your name when there is an open conference bridge.
• Stay focused on the tasks at hand.
• This is an important job; nevertheless we can still have fun.

Such a charter provides the mandate for the facilitator, for example a business analyst involved in a customer interview, to be prepared and with the mindset to manage all of the items listed above. In some situations, there may become a need for the facilitator to take control of the conversation, interruptions, or even the entire room. This takes a strong facilitator who has the presence to step into the potentially aggressive conversation to enforce the rules of engagement and the agreed upon charter. This takes skill and dexterity, nevertheless is required for the successful exchange of knowledge.

6.3 Chapter Summary

This chapter offered an analysis of the data results from the perspective of a sticky knowledge framework, to understand the situation being adjudicated. The author was an active participant engaged in action learning where I observed and logged much of the data gathered by observation. I accessed much of the data from minutes of meetings, correspondence, organizational documents that I had access to as well as jottings and notes and reflections from many formal workshops, meetings, informal discussions and ad hoc unstructured interviews, and perhaps more importantly from an action learning perspective I had my reflections.

This led to the development of a view of what was happening. Figure 6.1 expresses that view as an issue of sticky knowledge that carries forward from Chapter 5 data results and analysis. Figure 6.2 illustrates a knowledge transfer model in developing a new ICT product initiative. This enabled me to reflect and report in more detail the most important elements of knowledge stickiness. These are summarised in Table 6.2.
Table 6.2 - Knowledge stickiness factor summary

<table>
<thead>
<tr>
<th>Szulanski Factor</th>
<th>Brief Description</th>
<th>Comments and Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Source lacks motivation</td>
<td>Environment, co-location, charter</td>
</tr>
<tr>
<td>2</td>
<td>Source lacks credibility</td>
<td>Trust not rewarded for knowledge transfer</td>
</tr>
<tr>
<td>3</td>
<td>Recipient lacks motivation</td>
<td>Motivation, passivity, senior management vision, strategic intent</td>
</tr>
<tr>
<td>4</td>
<td>Recipient lacks absorptive capacity</td>
<td>Some evidence of boredom and distraction</td>
</tr>
<tr>
<td>5</td>
<td>Recipient lacks retentive capacity</td>
<td>Timely training, acronyms, language, jargon</td>
</tr>
<tr>
<td>6</td>
<td>Barren organizational context</td>
<td>Environment, interruptions, CoP</td>
</tr>
<tr>
<td>7</td>
<td>Arduous relationship between source and recipient</td>
<td>Trust, management style, rewards for knowledge transfer and risk taking. Resistance to change</td>
</tr>
</tbody>
</table>

The analysis now leads to a proposal in the next chapter, which presents an ideal model that the author proposes as an effective knowledge transfer model for this type of project and its rapid product development context. In that chapter I also discuss a validation exercise undertaken to offer this solution to other project managers who have experienced similar situations. While this cannot validate the model as being an ideal solution, it can validate it in terms of being a workable solution and a step forward that can be continuously improved by other reflective practitioners.
Chapter 7 - Knowledge Management Overlay Model Proposition

7.0 Introduction

This chapter takes the preceding chapters as its point of departure. The first research question posed in Section 1.6, and elaborated upon in Chapter 3 was, what drives poor business requirements production, that negatively impacts project outcomes in the implementation phase resulting in negative impacts to the overall project. This was answered in Chapter 4, in terms of creating an environment that encourages lean thinking approaches to both product and service development, as well as business process re-engineering, with a focus on retaining and developing vital knowledge about that product or service.

Two key aspects of this highlighted from the literature in Section 2.3.1 and 2.3.2 were that agile thinking and project management approaches are appropriate for turbulent and fast moving project environments, where speed and flexibility require a test and see approach, with work chunked and managed in quick and recursive cycles, similar to action learning. The second agile approach principle was to rule out waste. This can be seen from a sticky knowledge perspective as being influenced by knowledge flows about what constitutes waste and how it can be reduced or eliminated as noted in section 2.3.2. This also applies in training and development efforts after a new product or process is developed, where waste can be manifested by recipients, when knowledge transfer is limited in the way knowledge is received, and the degree of absorption of this knowledge by recipients. Also, it can apply to waste in effort of trying to transfer knowledge from the sender’s perspective. Chapter 5 took a focus on the implementation phase when a new business process improvement idea or new product is developed and implemented, where end users of this process, or support teams of the new product, are trained in its effective use. The chapter investigated development from a knowledge management perspective.
Chapter 6 then extended this theme further by focusing upon knowledge stickiness and how both the knowledge elicitation process for developing new ideas, and the knowledge transfer through training development and support teams, are inhibited from gaining knowledge about these new ideas, products, services or processes. Chapter 6 substantially answers the second research question asked in Section 1.6 being, how does the removal of the barriers to knowledge transfer and the enhancement to knowledge transfer ensure that customer requirements meet customer expectations and reduce the negative impact to project time, cost, system functionality and schedule?

The purpose of Chapter 7 is to provide a refinement of the model in terms of how it may be applied and how it is validated, to address the research proposition in Section 1.6. A knowledge transfer model is presented to overlay existing processes to improve the entire transfer of knowledge, so that a product idea instigator’s knowledge of what they perceive as being the benefit to be realized, and how that may be realized, is not diluted, altered or lost, and is in fact built upon through the development process from instigator or initiator to support groups (see Table 1.1 in Section 1.8). This is consistent with the thesis’ aims and objectives as set out in Section 1.9.

7.1 Background and Purpose of the Thesis Outcome

The title of this thesis recognizes the need to intervene in the typically disordered process of transforming ideas for improvement of the process that starts with an end user voicing a need for a change in a system to make their work more efficient and effective.

The context of this work is in developing new ICT products and administrative processes in a highly turbulent and competitive telecommunications organization that is trying to beat its competitors in developing new products, and developing improved efficient and effective processes to market, and support those products. The key competitive advantage that the organization needs to maintain is:

- New product ideas or upgrades and improvements to existing products that define them from competitors.
• A new administrative process that allows rapid speed to market of these products, that improves the end user’s experience, and thus makes the product more attractive.

In addressing the value proposition as highlighted by Anderson, Narus and van Rossum (2006), the value propositions to be addressed in this context relate to what they call points of difference. These are elements that make the supplier’s offering superior to the next best alternative.

Figure 7.1 illustrates the research proposition as outlined in Table 1-1 in Section 1.7. Knowledge is the vital element in moving from the original idea, through focus group idea enhancement, to provide the requirements that are then used by a development team through iterative processes to deliver the product. Users, particularly lead beta version users, are then highly instrumental as argued by Von Hippel, Thomke and Sonnack (1999) in not only refining a product, also in enhancing it through feedback and debriefing processes.
In the context of this organization under study, it may mean any new product of application, or it may mean a new process to take an order for a new product and process through the delivery process in a radically shorter period of time. The new products or process improvements can be initiated by a range of people. A person in the marketing or business development department may have identified what is a new killer application, that is a new application that can overwhelm competitors’ offerings as a step change in technology, or a person in the product to customer administration chain may have an idea about how to radically transform a business process to improve speed to market, or to significantly reduce administration costs. In either case, the initial idea is relatively fuzzy and vague, and the idea proponent often does not perceive the potential ramifications or potential full benefits that the idea may generate. Good ideas are built upon good ideas. This means that capturing knowledge about the initial idea, and then capturing knowledge from a range of stakeholders who can improve that idea is paramount in developing a killer application or process improvement. Knowledge is created as a
valuable asset when it is reframed, reused, transferred and applied. Finally, when the product or process is in use, feedback knowledge from the user to the business analyst closes the knowledge loop about the use being made, both as it is intended to be used, and as serendipity prompts to use the product or process in unexpected ways. This feedback extends to the development realization team and others in this knowledge chain. This last debriefing stage allows for further improvement in the way new ideas should be captured.

7.2 Application of the Knowledge Transfer Model Process

This section outlines how this model can be applied at the initial idea and pre-development phase, the idea development phase, the idea realization phase and the debriefing phase.

7.2.1 Requirements Interview and Focus Group Session

Table 7.1 illustrates a summary of the problem and solution that is offered by the knowledge transfer model to overcome each of the identified stickiness factors. More detailed description follows at each of these phases.

Table 7.1 - ‘Knowledge stickiness factor summary at the idea generation and pre-development phase

<table>
<thead>
<tr>
<th>Szulanski Factor</th>
<th>Problem Description</th>
<th>Solution Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Source lacks motivation</td>
<td>Source may be reluctant to share knowledge</td>
<td>Create a learning environment, co-location, F2F exchange</td>
</tr>
<tr>
<td>2 Source lacks credibility</td>
<td>Source may not be able to articulate the knowledge</td>
<td>Trust, listening skills</td>
</tr>
<tr>
<td>3 Recipient lacks motivation</td>
<td>The business analyst may feel that this idea is trivial or should be a low priority one</td>
<td>Senior managers need to have a clear statement of strategic intent and a vision for the whole improvement process. Job performers felt that they needed the support of management</td>
</tr>
<tr>
<td>4 Recipient lacks absorptive capacity</td>
<td>The business analyst needs to have a clear understanding of the interviewee’s perception of the problems they face</td>
<td>Having a process that makes the perceived problems clear and explicated is vital for the business analyst and interviewee to explore cause and effect loops as part of this phase.</td>
</tr>
<tr>
<td>-------------------------------------</td>
<td>---------------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>5 Recipient lacks retentive capacity</td>
<td>A strong tacit exchange of knowledge</td>
<td>The use of actual hands on activities where the learner is actually doing the process that is to be learned, within the process.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Reduce distractions by removing cell phones and smartphones, not answering email, instant messages or answering phone calls.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The learning team created a team charter that was used to guide the team with respect to how they would treat each other being polite, respectful, not interrupting as well as guiding principles.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>People-to-people contact, and human interaction.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Timely training.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Information, communication technology i.e. on-line or virtual courses.</td>
</tr>
<tr>
<td>6 Barren organizational context</td>
<td>A context where knowledge can grow</td>
<td>Communities of practice.</td>
</tr>
<tr>
<td>7 Arduous relationship between source and recipient</td>
<td>Learners felt that senior managers did not give learners the time to actually gain quality learning experiences</td>
<td>Understaffed work environments gave learners less time to participate in quality learning.</td>
</tr>
</tbody>
</table>
For all cases observed at Organization XYZ Telecom, the business analyst is required to understand and accept a number of premises before the initial interview with the end user. These appear to confirm with best practice consistent with the literature discussed in Section 2.6 regarding the Software Engineering Institute’s requirements taxonomy tool illustrated in Figure 2-7. The first is that the requirement(s) that the end user wants or needs must be what the end user truly wants or needs, and not what the business analyst believes the end user needs. The business analyst cannot carry into the knowledge exchange any preconceived models on the final product or solution. Second, it is not the activity of the business analyst to even consider the final solution during the initial interview. The initial interviews are for gathering what the end user believes are his or her needs or wants and articulates them in plain language, being in the language of the end user. Solution investigation is an activity that occurs after the initial interviews are completed by the business analyst or a small team of two or three business analysts. The technique is that the product or solution is considered only after the requirement interviews are completed, and they cannot be completed concurrently.

This initial requirement in the idea generation and pre-development stage for a process improvement or product generated from the bottom up means that in terms of Factor 1, the source is generally highly motivated for the reason that he or she has initiated the idea and not had it imposed upon them. Motivation is also enhanced when the knowledge exchange is completed face-to-face or is in a collocated environment. Factor 2, being the source lacks credibility, can be enhanced with the business analyst listening intently and attentively to the interviewee, as well as creating a safe and trusting relationship. Factor 3, the recipient lacks motivation, can be resolved with actual senior management support. Factor 4, the recipient lacks absorptive capacity, can be resolved with a clear process that makes the perceived problems understandable. Factor 5, the recipient lacks retentive capacity, is answered through having the recipient complete hands on activities versus just being given the instruction then left on one’s own to figure it out. Learning in a real life environment, with live orders, enhances the tacit knowledge exchange. Retentive capacity is also increased with a reduction of destructive distractions. Factor 6, a barren organizational context, can be resolved with a community of practice to engage resources.
in a shared domain for collective learning. The final factor from Szulanski’s (2003) components, being Factor 7 an arduous relationship between source and recipient, can be reduced if the learners are given the time to learn. This summary of the Szulanski factors is related to the initial idea generation and pre-development phase.

7.2.2 Requirements Interview and the Successful Knowledge Exchange

The interview session, conducted by the business analyst, is the first and most important step in the articulation and documentation of the customer’s or end user’s requirements. This is the foundation and starting point of the knowledge transfer process. From this starting point, being the customer or end user giving his or her business needs, knowledge is only diluted going forward, as the information is then passed from individual to individual within the project team, and department to department within the various groups in the organization associated with the project.

There are a number of tasks that the interviewer is obligated to complete to comply with in the knowledge transfer model. First and foremost, before the session takes place, the interviewer is to be prepared ahead of time for the interview. This includes a clear, crisp, and concise agenda that is given to the interviewee(s) in advance. The premise is to let the interviewee(s) have some time to understand the discussion that will take place, reflect, and come to the session prepared. The interviewee(s) needs to comprehend what is going to be discussed, as the interviewer will be asking for the interviewee(s) to articulate his or her needs with respect to the project or solution that they desire. The interviewer will be meeting with the interviewee(s), and will be asking a series of open and closed questions to encourage the outflow of information from the interviewee(s), in order to document the business requirements. Business requirements are expressed in the customer’s or end user’s own words, versus technical jargon. The agenda will include the project name, purpose, objectives, and element of the meeting, as well as who is expected to attend, with the date and time. The agenda for the interview is then broken into items, responsibility timelines, and the rules of engagement as illustrated in
Appendix K. If documents are associated with the agenda, they are attached. The interviewer needs to be aware that in some cases, the interviewee(s) will not read lengthy attachments ahead of time; therefore, this information must be reviewed during the interview.

Once the agenda is published to the interviewee(s), they require time to reflect on the new project that will be discussed. The agenda will state that the interviewee(s) is to read the attached documents, if there are attachments, and to expect to answer questions on their existing process, and the enhancement that they may be considering. Questions can be communicated ahead of the scheduled session directly to the business analyst, to clarify any topics for the interviewee(s), and this should be stated by the interviewer within the agenda.

The interviewer, in this case the business analyst, is to prepare the questions for the requirements session that are used to extract the knowledge, to create the business requirements. The interviewer starts the session with a general overview of the project and solution, as well as framing the discussion. The goal for the beginning of the interview is to open the session with a high-level perspective and gradually become more and more granular in detail. By starting with the overall objective of the project in one or two sentences, which may include the business drivers, the business analyst then describes the scope of the project. The scope of the project is the details around what it is that will be completed by the project team, and what will not be completed. The next phase of the discussion surrounds the desired functionality of the final product or solution. From here, the business analyst begins the detailed questions surrounding the project requirements. Table 7.2 illustrates how a phased approach to defining project details can reduce knowledge stickiness.
Table 7.2 - Phases of defining details and reducing knowledge stickiness

<table>
<thead>
<tr>
<th>Phase in Project Detailed Requirement</th>
<th>Problem Description Related to Lean PM Thinking and Waste Reduction</th>
<th>Suggested Remedy Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall objectives of the project</td>
<td>Customer or end user articulates an ambiguous and limited need</td>
<td>Focus on the tacit exchange with open questions, listening to learn to get to the root issues, e.g. 5 Whys – see Table 7-3 later</td>
</tr>
<tr>
<td>Overall Scope of the project</td>
<td>Unclear at the start of the project</td>
<td>Focus on the tacit exchange with open questions, listening to learn, 5 Whys, follow-up meeting</td>
</tr>
<tr>
<td>Desired functionality</td>
<td>Vague at best at the beginning of a project and evolves as the project progresses</td>
<td>Open questions, listen to learn, move to closed questions</td>
</tr>
<tr>
<td>Business requirements</td>
<td>Requirements will change in the life cycle of the project</td>
<td>Plain language in the customers words</td>
</tr>
<tr>
<td>Functional requirements</td>
<td>Requirements will change in the life cycle of the project</td>
<td>Linkage back to business requirement</td>
</tr>
<tr>
<td>Detailed documentation</td>
<td>Lean S/W development has minimal documentation</td>
<td>Plain language, little technical jargon, all acronyms written in full words within the document</td>
</tr>
</tbody>
</table>

The interviewer starts with high level, open-ended questions. Open-ended questions hold less risk of being biased from the interviewee’s(s) perspective, and are better suited to bring to light tacit knowledge and the interviewee’s(s) attitudes on the topic (Vinten, 1995). Open questions provide a valid and legitimate response, as the interviewee(s) is required to answer the question in his or her own words. Closed questions are of no value to the interviewee(s) if they are not aware of the project or solution. The closed question is appropriate for understanding if the interviewee(s) is in agreement or disagreement. Once the open-ended question is presented, the interviewer needs to listen.

When asking a question in a requirements gathering session, the interviewer is to:

1. Ask only short questions to resolve one point of interest
2. Ask only one question at a time and not multiple questions in one string
3. Questions are to end with a question mark (?) placed at the end of a sentence to indicate a question (versus making a statement)
4. The interviewer’s opinion, personal beliefs or judgments are irrelevant
5. Follow-up questions start with why
6. Listen to learn

The interviewer needs to not only listen, they need to understand and listen to learn. For the interviewer to interpret and understand, he or she must listen intently and not interrupt. The interviewer is required to keep his or her personal bias constrained and be as objective as possible when both sending and receiving information. Once the interviewee(s) has finished with his or her answers, the interviewer can then, and only then, ask a clarification question, being a question to understand the meaning of an acronym, or item that the interviewer is not familiar with, then they follow up with a why question.

Finally, before moving to the next question, the interviewer reads the interviewee(s) response back to the interviewee(s) to ensure that the knowledge transfer is complete and correct. The interviewer will not use the same words as the interviewee(s), as the interviewer has received the information from the interviewee(s), processed it within the interviewer, and then resends back to the interviewee(s). This process sees the interviewer reprocessing the information into his or her personal schema, then presenting it in his or her own words for the interviewee(s) to validate. The words do not have to be the same, the meaning does.

Wiegers (2003) argues that the interviewer needs to evaluate all questions and discussions to ensure that the requirements, and any subsequent dialogue, are within the scope of the project. Scope creep is a chronic issue with projects, and this potential problem can start during the requirements gathering phase. The interviewer must be mindful that any discussion and documentation is within the scope of the project. The interviewer must have a clear understanding of the scope of the project before the interview, and it is suggested that he or she have a hard copy of the scope statement if
there is a need for clarification during the requirements gathering session to ensure compliance. Any requirements that fall outside of the project scope can be recorded under a parking lot category and reviewed at a more appropriate time. This will ensure the out of scope requirements are noted and documented for future discussion. Any requirements under the parking lot category are out of scope, and will not be part of the project unless the sponsor chooses to increase the scope of the project to accommodate these requirements. The process of changing project scope has significant governance surrounding the procedure, including a number of approvals.

It is important that the interviewer understands that their most important role is to guide the conversation, listen and document the results. Requirements interviews are not about persuading or influencing the interviewee in any way. Requirements interviews are also not a negotiation of customer needs; they are about an unbiased interviewer listening to the needs of the customer, related to the final product or solution the customer wants and needs.

The Five Whys methodology is an approach as illustrated by McVey and Bridges (2009) that describes a process for unearthing the root cause of a customer’s issues. By using a series of questions, typically from three to seven questions, the interviewer can build on each preceding question to excavate from the perceived issue, to the actual problem by using this method to delve into the cause and its effect of the underlying relationships. The goals are to understand the root cause of the issue and not just the superficial symptoms.

By way of example, the business states that its customers are complaining about the service levels, and the interviewee, in this case the business stakeholder believes the solution is to automate somehow using a software solution. The following series of questions illustrates the questioning process that a business analyst might take in this situation using the Five Whys methodology, starting with the business analyst (McVey and Bridges, 2009).
Business Analyst: “Why is the service level a problem?”

Business/Stakeholder: “It’s a problem because our clients have to wait too long to get a service agent.”

Business Analyst: “Why do they have to wait so long?”

Business/Stakeholder: “From our reports, we see that there is a surge of calls at the end of each month.”

Business Analyst: “Why is there a surge of calls at the end of the month?”

Business/Stakeholder: “The end of the month is when we pay out claims.”

Business Analyst: “Why are claims paid out at the end of the month?”

Business/Stakeholder: “Because we have always done it that way.”

Business Analyst: “Do we have to do it that way?”

Business/Stakeholder: “No, probably not.”

Table 7.3 below is another example of the Five Whys. The Five Whys is a general methodology for the business analyst to follow during an interview for business requirements. As noted on the quality Training Portal – Resource Engineering, Inc. website (Quality Training Portal), it is important that when using this method that the interviewer is not leading the interviewee with a preconceived why (Quality Training Portal, 2009). The goal is that the interviewer is to be impartial and is only extracting information that is from the interviewee perspective.

Table 7.3 - Fives whys

<table>
<thead>
<tr>
<th>Defect</th>
<th>Reasons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Why 1 – Why did the defect occur?</td>
<td></td>
</tr>
<tr>
<td>Why 2 – Why did that occur?</td>
<td></td>
</tr>
<tr>
<td>Why 3 – Why did that occur?</td>
<td></td>
</tr>
<tr>
<td>Why 4 – Why did that occur?</td>
<td></td>
</tr>
<tr>
<td>Why 5 – Why did that occur?</td>
<td></td>
</tr>
</tbody>
</table>
7.2.3 Follow-up meeting

When required, there can be a follow-up meeting in the case where the business analyst feels that there are questions and or uncertainty with respect to any issues that cannot best be understood or clarified via email or a phone call. The follow-up session is a formal and structured meeting, similar to the preliminary interviews between the business analyst and the customer or end user, with a formal agenda, a controlled environment, and the reduction of distractions. This session is generally much shorter and addresses only the points needed for clarification. All of the methods noted in the knowledge management model are followed. The business analysts need to ensure that they do not bring any of their personal bias to the session, and that a true exchange of knowledge in fact does take place during the session. As with all official contact with the customer or end user, all exchanges are formally documented as a record for future discussions, as well as the basis for the upcoming more detailed requirements, that will be passed to downstream project team members. The goal of the formal documentation is to ensure that as the data moves from preliminary discussions, then written into business requirements, and system and technical requirements through to training requirements, there is a clear linkage forward and backward through the documentation. If the training leader needs to understand the business requirement that may have been created and written months prior to receiving them, he or she can go back into the documentation and follow the flow of information and gain a clear understanding that is free from confusion or doubt.

7.2.4 Documentation

The documentation of the exchanges of knowledge are as important as the actual exchange of the knowledge, if it is to stay consistent as it is passed through the project management phases and various team members and teams. Sound structuring of explicit knowledge in documentation is a critical part of addressing waste through needless rework, and it can help consolidate explicit knowledge in a lean project management
approach. If the knowledge exchanged for project requirements is not documented and recorded effectively, the knowledge of the requirements will become diluted over time as it is passed to others within the project. Hargis, Carey, Hernandes, Hughes, Longo, Rouiller, and Wilde, (2004) argue that high quality documentation is easy to use, easy to understand and is easy to find.

Easy to use is focused on tasks related with the product or solution, accurately documented, free of errors, and factual and complete. Easy to understand is centered on ensuring that the users can in fact understand what is being documented, with correct writing conventions. Finally, easy to find is the information that involves the general organization and ease of gaining access to the documentation, as well as the visual attractiveness of the document (Hargis et al., 2004).

![Figure 7.2 - Document writing](image)

The first step in the process of successfully documenting and writing user requirements is to clearly understand the users and understand what is important to the user. How do they want the solution to work and what do they want the product or solution to resolve. The next step, as noted in Figure 7.2 is to outline the major tasks and topics as a starting point to begin writing and revising the documentation. This integration of writing, reviewing, and revising continues until the writer is confident the document is a sound and valid document that can be passed to others. The goal of documentation is to create a document that can be passed to other downstream resources of the project team and ensure that the knowledge is transferred successful. The downstream project resources must understand the documentation or the document has no value whatsoever. Wieringa,
Moore and Barnes (1998) add to this process by noting that once the document is completed, it must be tested and then updated as required. The testing phase would see an end user read the document and validate that it is in fact grounded in logic and truth, and the document does in fact resolve the issue that the document is addressing. If the document is then considered a living document, there needs to be two additional tasks added to the documentation process. The first is the document must have a version control system applied to the working document. Version control of a document ensures readers that they are in fact reading the most current document. As the document is updated, the version number represents the latest version. The second is that the document needs to be reviewed periodically. This does not necessarily mean that the document will be revised, although in many cases it will. This does mean that it is reviewed with the end user to ensure that it is current and still valid.

The language that is used is also a defining component of documentation and the successful transfer of knowledge. The words that we choose, and how we write the requirements, have a direct impact on the amount of distortion that occurs during the transfers of information. Below is a list of recommendations used to write sound requirements (Wiegers et al., as quoted by Kovitz, 2003).

- Write complete sentences. Keep them short and to the point. Use correct grammar and syntax
- Use the active voice for example “The application shall prompt for a user ID”
- Use terms, consistently throughout all documentation and defined in the glossary
- List all acronyms with an explanation
- State requirements in a consistent fashion

As well as the recommendations stated above, there are a number of ambiguous words or words that have multiple interpretations that will have limited meaning to the receiver or will be dependent on the receiver’s perspective. In the case of vague and unclear words or terms, receivers will fill in the words they do not understand, are uncertain of, or are
ill-defined with what they believe the sender is trying to send. It is not advocated to use words such as those listed in Table 7.4. The table gives ambiguous words with alternative wording for a more successful exchange of knowledge and understanding. A full list of ambiguous terms can be located in Appendix L.

Table 7.4 - Ambiguous Terms (Wiergers, 2003, p.182)

<table>
<thead>
<tr>
<th>Ambiguous Terms</th>
<th>Ways to Improve</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acceptable</td>
<td>Describe and characterize what is acceptable. “The system will close in 20 seconds…..”</td>
</tr>
<tr>
<td>Adequate</td>
<td></td>
</tr>
<tr>
<td>At least</td>
<td>Detail the minimum and maximum limits. “The mean time to repair is between the maximum of four hours and a minimum of two hours.”</td>
</tr>
<tr>
<td>At minimum</td>
<td></td>
</tr>
<tr>
<td>No more than</td>
<td></td>
</tr>
<tr>
<td>Not to exceed</td>
<td></td>
</tr>
<tr>
<td>Depends on</td>
<td>Describe in detail what the dependency is and how they are interrelated. “System ABC will be pulling from fields one and two the customer name and customer address from system XYZ….”</td>
</tr>
<tr>
<td>Efficient</td>
<td>In detail describe the limits quantifiably surrounding efficiencies. “The system ABC will pull data from system XYZ every 15 minutes…..”</td>
</tr>
<tr>
<td>Fast</td>
<td>Describe in a quantifiable number the acceptable speed. “The system will perform task 14 in two milliseconds”</td>
</tr>
<tr>
<td>Rapid</td>
<td></td>
</tr>
<tr>
<td>Quick</td>
<td></td>
</tr>
<tr>
<td>Flexible</td>
<td>Illustrate how the system will transform in response to a change in a business need. “If the user inputs data into field 24 that is more than 75 characters the system will…”</td>
</tr>
</tbody>
</table>

The objective is to write in plain language giving enough detail for both the sender and receiver to understand and fulfill the customer’s request as per the requirement.
The discussion above reconciles the knowledge exchange for the idea generation and pre-development phase of the knowledge management model.

### 7.2.5 Implementation Group at the Idea Realization Phase

Table 7.5 illustrates a summary of the problem and solution that is offered by the knowledge transfer model to overcome each of the identified stickiness factors between the development team, or the recipient, and the end users, or the source. A more detailed description follows at each of these phases. It is during the idea realization phase that the development team and coders formulate, organize and plan the product or solution. There is continued interaction with the idea generator or the developer’s proxy to iteratively inspect and adapt the requirements from the product backlog as outlined in section 2.3.1, and develop, as well as possibly test, the practical outcome of the idea.

Table 7.5 - Knowledge stickiness factor summary at the initial realization phase

<table>
<thead>
<tr>
<th>Szulanski Factor</th>
<th>Problem Description</th>
<th>Solution Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Source lacks motivation</td>
<td>N/A</td>
<td>Customer collaboration</td>
</tr>
<tr>
<td>2 Source lacks credibility</td>
<td>N/A</td>
<td>You can change the scope, features, technology, architecture but you do not change the vision</td>
</tr>
<tr>
<td>3 Recipient lacks motivation</td>
<td>The development team may feel that this idea is trivial or should be a low priority one</td>
<td></td>
</tr>
<tr>
<td>4 Recipient lacks absorptive capacity</td>
<td>Lack of focus</td>
<td>Task switching and illustrated in Section 2.3.2</td>
</tr>
<tr>
<td>5 Recipient lacks retentive capacity</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>6 Barren organizational context</td>
<td>Development team become disjointed and lacking orderly continuity</td>
<td>Radical co-location and the reduction of motion as illustrated in Section 2.3.2</td>
</tr>
<tr>
<td>7 Arduous relationship between source and recipient</td>
<td>Differing views</td>
<td>Agile development is based on the premise that team is focused on delivering customer value</td>
</tr>
</tbody>
</table>
Table 7.5 above depicts a summary of the problem and solution that is offered by the knowledge transfer model to overcome each of the identified stickiness factors, with the focus on the idea realization component of figure 7.1.

7.2.6 Environment

The environment for the successful transfer of knowledge requires such items as comfortable chairs and tables, correct lightings and comfortable ambient temperature within the room. The area needs to be clean, free of pollutants such as clutter from books or papers. No visual distractions, such as open windows, flickering lights, pad boards and whiteboards with non-related information on them, to draw away the attention of the receiver. The use of radical co-location that is the concept that sees team members such as a project team co-location brainstorming session or training session being conducted in a face-to-face environment.

7.2.7 Logistics

Logistics for knowledge transfer include a team charter that outlines the rules of engagement for the team and the rules of behavior. A clear and concise agenda for all knowledge transfer sessions, such as requirements gathering and or training, is needed to keep the session on track and focused. Table 7.7 illustrates the complete logistic approach with input from data gathered from the survey output from Chapter 4 and focus group data from Chapter 5.

Table 7.6 - Logistics approach

| General | - Clear concise agenda that is followed  
|         | - 50 minutes of meeting time with 10 minute break every hour for email and personal time.  
|         | - Formal documentation of all discussions |
| Destructive Distractions | - Stay focused on one task  
- All acronyms identified on the slide or the specific page of the document in which they reside  
- No electronic devices  
- Prohibit multitasking |
|--------------------------|---------------------------------------------------------------------|
| Facilitation             | - Express all acronyms in writing  
- Avoid interrupting or finishing others peoples sentences  
- Just listen – more importantly listen to learn and understand  
- Avoid stepping in front of a projector  
- Use eye contact |
| The Interview            | - Be prepared  
- Agenda  
- Start with open-ended questions  
- State a follow-up question starting with why  
- Listen and understand  
- Be familiar with and clearly understand the scope of project  
- Ensure the requirements are in scope |
| Follow-up                | - As required  
- With formal documentation |
| Documentation            | - Use plain language  
- Describe the business requirement as a story |
7.2.8 End-User Feedback Group at the Idea De-Briefing Phase

Table 7.6 illustrates a summary of the problem and solution that is offered by the knowledge transfer model to overcome each of the identified stickiness factors for the idea de-briefing phase. As with the idea generation, and pre-development and idea realization phase, there is an exchange of knowledge. The de-briefing phase brings the business analysts, or the source, and the end user, or the recipient, together to reflect and agree on the solution or idea under discussion.

Table 7.7 - Knowledge stickiness factor summary at the initial de-briefing phase

<table>
<thead>
<tr>
<th>Szulanski Factor</th>
<th>Problem Description</th>
<th>Solution Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Source lacks motivation</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>2 Source lacks credibility</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>3 Recipient lacks motivation</td>
<td>End user does not concur with the solution</td>
<td>The solution addresses the vision</td>
</tr>
<tr>
<td>4 Recipient lacks absorptive capacity</td>
<td>Does not have the background to perceive cause and effect links, lacks underpinning knowledge to know how to use the knowledge</td>
<td>No jargon, ambiguous term, acronyms.</td>
</tr>
<tr>
<td>5 Recipient lacks retentive capacity</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>6 Barren organizational context</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>7 Arduous relationship between source and recipient</td>
<td>Pre-existing relationship</td>
<td>Trust and commitment to collaborate in the task of sharing knowledge</td>
</tr>
</tbody>
</table>
7.3 The Knowledge Management Overlay Model

The chain of logic presented thus far in this chapter is that a lean project management approach is needed in a complex, turbulent and uncertain environment, where speed to market for new products, or more effective processes, is essential. The tables presented above highlight stickiness in knowledge factors with problems and potential solutions. The knowledge management overlay model is now presented as a holistic solution to bring the project phases for each idea realization cycle, as well as the actors that are involved in this transformation as illustrated in Figure 7.3.

![Knowledge management overlay model](image)

Figure 7.3 - Knowledge management overlay model
The phases of idea generation and realization are shown as an iterative and tightly coupled entity, with a de-briefing feedback loop connecting all involved in this transformation process. A common theme is how focus is increased and distractions are avoided to meet the relevant lean agenda goals of driving out waste and enhancing flexibility, and recursive iteration between players in a way that as much knowledge is captured as is feasible, and that this knowledge is value added at each iterative step in the project delivery of the product, be that a software application or a process improvement. These steps, that need to be taken, will now be discussed in greater detail.

### 7.3.1 Hierarchal Framework

The knowledge management model process is built upon a hierarchal framework, classified according to the criteria of the successive levels. The framework is constructed so that each major component in the structure is built upon the underlying component. This systematic approach ensures a complete cycle of knowledge transfer is successfully accomplished. Starting with the environment, the model moves through logistic, destructive distractions, facilitation, interview, follow up, and documentation, as depicted in Figure 7.4. There is a consistency of effective, quality knowledge transfer through the environment to the documentation layer. From an agile development perspective, one of the main goals is to remove waste as illustrated in Section 2.3.2.
The knowledge management model is then overlaid (as illustrated and highlighted in yellow in Figure 7-5) onto a waterfall or agile project management methodology. Projects reduced to their simplest competency ultimately are the successful movement of new knowledge between actors of the overall project from customer, to project team, sponsors, and all stakeholders. Without the successful exchange of knowledge, the probabilities of success are limited.
7.3.2 Value Delivered by the Knowledge Management Model

The knowledge management model has been composed to move the model into the foreground and make it visible, prominent, and as well, to augment the transfer of knowledge process as illustrated in Figure 7.5. The overall goal of the model is to develop and enhance the enablers of knowledge transfer, as well as to recognize and discourage the many barriers and sticky knowledge, to achieve successful knowledge
transfer. It is to be exploited for the transferring of knowledge, maintaining the integrity of knowledge, as well being used as a communications method to resolve complex issues, customer or end user requirements, and unraveling an ill-defined problem, through the clarity of knowledge transfers, in a project environment. This model brings into view a delicate balancing act between the sender and receiver, between being focused and or being distracted, with respect to communications and knowledge transfer.

In the professional setting, which is the focal point of the thesis, during adult training, requirements gathering sessions and problem solving, many of the behaviors and routines of the undergraduate environment can still be observed, however in a much less obvious manner. Professionals attending meetings and training sessions arrive armed with an arsenal of communication devices such as smart phones, to stay in contact with the home office, and laptops to read email or work on other items during breaks in the meeting or moments of boredom. Again the perception is that humans can effectively multitask as they attempt to solve and decipher, in many cases, extremely complex problems. I was once informed by a young professional at a session I was facilitating that “I am really good at multitasking, and the research states that multitasking is a good way to get lots of work done”. Unfortunately she could not cite the research to which she was referring. The entire time I was having this conversation with the young woman, she was typing into her smartphone and subsequently, constantly asked me to repeat what I was saying.

As noted in the research stated early in this thesis, in many cases, employees are stretched past the point of being able to complete all of their normal day-to-day workload. The expectation from the employer is to have stretch targets for employees, resulting in employees not being able to complete all of their work. While attending meetings for one project, deadlines are looming for another. In this professional scenario, the balance or equilibrium now begins to tilt toward distraction. In many cases, participants do not adhere to meeting agendas and timelines. Employees are forced to leave a meeting that is in progress to attend to other higher priority activities or emergencies. Staff arriving late ends up missing pertinent information that is given at the onset of the session, causing another distraction as they begin to interrupt and distract others in the session to catch up
with what they have missed. This is but a list of a small number of distractions that can be avoided by the knowledge management model.

The knowledge management model is intended to be straightforward and easily understood so that employees involved in the effort of knowledge transfer will accept and embrace the model. Change management experts argue that people resist change for a multitude of reasons such as, but not limited to, the fear of change, improper training, and a lack of motivation (Lientz and Rea, 2004; Hayes, 2007). The knowledge management model, if positioned correctly, can remove the fear of change. The knowledge management model will ensure that organizational communications exchanges require less effort, making the knowledge transfer increasingly effective and efficient. Training on the knowledge management model is directed to the characteristics and practices of the facilitators, business analysts, problem solvers or speakers, rather than the entire organizational body of employees. The knowledge management overlay model increases motivation because it reduces rework throughout the entire organization, rework that typically results from not being able to successfully exchange knowledge in the first round of communications. Resources gain a greater sense of personal value and with respect to their projects, as they feel that they are heard and more importantly, understood. There is no need to say things twice, and one does not have to continually clarify what they are saying as the receiver is listening and understanding.

7.4 Validation of the Model and Results

It is important that in a practice based-doctoral thesis that are new insights offered as a contribution to project management practice are challenged by qualified peers who experience the reality of the context under study. With this in mind, I undertook a peer validation of the model and guiding principles presented in this thesis.

The knowledge management model was developed in a unique setting. The methodology used to develop it was a specific case study of a messy new product and process development that I participated in. Data gathered was varied, and much of the data were
subjective from my reflection and from the surveys of those interviewed, both semi-
formally and informally. For an action learning approach to be valid, there must be
learning and improvement. Results that are offered as evidence of success should include
improvement in the process and improvement in the learning of the researcher, with
results being capable of wider dissemination to benefit others in similar situations to the
case study one.

Cavaleri (2004, p.163-164) states, in American pragmatic philosophy, most commonly
associated with Charles S. Peirce, William James, and John Dewey, causal claims or
knowledge claims are viewed as being important mirrors of one’s beliefs about how and
why things work as they do in practice. In pragmatism, determining whether a specific
action works reliably well in practice to yield the expected result is seen as being an
important step in determining the validity of not just the actions taken, but also of the
beliefs that underlie them. According to Peirce’s Pragmatic Maxim, the merits of one’s
beliefs are best judged by looking at the effectiveness of the effects they produce.
According to this perspective, the importance of the feedback one receives about the
effectiveness of prior actions taken is not so much to validate the knowledge used in
obtaining these results as it is to clarify one’s beliefs about how and why things work as
they do in practice” and on page 166 he states, “what is true or valid is ultimately decided
on by the community who are most interested and experienced in a domain of practice”.

Consistent with this view of validity, I sought further feedback from colleagues and my
peers who are also deeply involved with similar problems, and I sought the feedback of
this expert panel through a presentation of the results of this thesis. The details of how
the validation took place and the feedback received is presented below. I presented on
April 21, 2010, to 21 experienced lifelong project management practitioners that
collectively held 227 years of project management experience. The knowledge and
experience of these individuals included, but was not limited to, project manager,
program manager, facilitation, Six Sigma, communications, training, software
development, research and development, process development and risk management, in
the domains of finance, information technology, infrastructure, telecommunications and
insurance. Upon completion of a 60 minute presentation of the results of the thesis, a survey was conducted asking three questions.

The first question was presented as, "Would you recommend this model to a project management or change management organization”? Using a Likert scale, with 1 being strongly disagree, 2, disagree, 3, neither agree nor disagree, 4, agree, and 5, strongly agree, 77% agreed that they would recommend the knowledge management model to a project management or change management organization. The full results are illustrated in Appendix M. The survey then moved to two open-ended questions starting with, “Why do you think the model would be effective in the workplace?”, and “Why do you think this model would not be effective in the workplace?

Responses to the question “Why do you think the model would be effective in the workplace?” included:

“I think it would more openly acknowledge and recognize the barriers to knowledge transfer. This may provide an opportunity to change and or alter the impending course of distraction and multitasking that we are currently on.”

“This model would be effective in the workplace as it allows for time management instead of time slicing which allows individuals the opportunity to put their best effort forward and complete tasks properly.”

“Demonstrated thru factual data that the model can work by raising awareness of distracters that we invite in or assume "have to be" part of our working environment.”

“It's a good overview of some interesting methods - voice of the customer or user needs analysis combined with high performing teams. The concepts made sense and can be applied somewhat easily.”
Responses to the question “Why do you think this model would not be effective in the workplace?” included:

“Due to aggressive company timeline demands and a diminishing workforce, individuals are forced to 'multitask' in order to cover all expectations and objectives.”

“Works somewhat against human nature and may be disregarded because I think many people are disinterested in actually receiving knowledge.”

“At XYZ Company we move very fast and often times don't see value in producing documentation. I was fortunate to work under Bob Smith (not an actual name) for two plus years and learned how to perform technical review which is a key method strategy to write requirements clearly. Bob is no longer with XYZ Company but I think XYZ Company was not ready for such Discipline.”

Overall, the feedback was very positive, with many of the participants asking for more information that would help them start using at least parts of the knowledge management model.

Having utilized the model in the real world I have received comments such as, “as the receiver....I will get more valid information....and my information passed down was of more value” and “questions of clarification are true and value added questions....not questions because the receiver was distracted...no unnecessary repeating/wasting everyone’s time”. Other comments included, “this model ensures I give the customer what they want...do it right the 1st time”, as well as, “know up front whether what the customer wants really can be done”. In addition, “don’t lose anything as you move the information from group to group and back”, and, “keeping the customer request correct”.

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7.5 Chapter Summary

This chapter has described the author’s purpose and the thesis outcome, and how the knowledge management overlay model can intercede and assist in transforming ideas into reality, through project management methodologies, in a project management environment. Through the initial idea and pre-development phase, the idea development phase, and the idea realization phase and the de-briefing phase, the chapter resolves a number of barriers to knowledge transfer and correlates the barriers to Szulanski (2003) sticky knowledge factors. The chapter gives details on options within the knowledge management overlay model for successful knowledge transfer in a real world project environment. The chapter also gives details on the value of the model to project team members by bringing this knowledge into view for project practitioners. The model is used to enhance enablers to knowledge transfer and reduce the barriers using the hierarchal framework overlayed onto a project management methodology. Finally, a section is included which demonstrates that this model was tested on a significant group of my peers who face similar situations to that studied and that the response was positive and that both data and analysis pass the test of pragmatic practicality by experienced PM peers that it is indeed a positive and valuable contribution to PM practice.
Chapter 8 - Thesis Summary

8.0 Introduction

This final chapter concludes the thesis. It begins with a brief review and summary of the aims, scope of the research thesis, and aims and objectives of the research. This is followed by a summary of findings, and then followed by an examination of the original contribution to the project management body of knowledge made by this work. A number of limitations and further research opportunities follow and the chapter summary is presented.

8.1 Prologue

The DPM encompasses a combination of both coursework and research in a practical setting. The research question addressed by this thesis was:

What drives poor business requirements production that negatively impact project outcomes in the implementation phase that result in negative impacts to the overall project? How does the removal of the barriers to knowledge transfer, and the enhancement to knowledge transfer, ensure that customer requirements meet customer expectations and reduce the negative impact to project time, cost, system functionality and schedule?

The outcome of this thesis originated from both the course work activities and over 25 years of observations of poor knowledge transfer in a professional project management setting. It was a practical thesis based on a practical problem facing an experienced project management team, and used the power of reflective practice as a key ingredient to the philosophical approach to investigating the research question. Chapter 4 clearly outlined my ontological stance and the epistemological paradigms that explain how I perceived reliability of data, evidence and proof to justify my conclusions. Results were, as outlined in Section 7.4, presented to an experienced group of my peers for them to challenge and for me to gauge their reactions to my findings.
8.2 Research Summary

Product or solution requirements are a mandatory element and activity within all projects. There are also a number of discrete processes that surround requirements and requirements analysis. Requirements are defined in the systems development process and the many project management methodologies such as agile project management, extreme development and waterfall project management. Regardless of the methodology one uses, or the processes employed, the end goal is to create a product or solution that the end user or customer wants and will use. Requirements ultimately come from the customer, and the success and validity of the requirements can only be articulated from the end user, customer or stakeholder(s) to the project team, in their own language and words, as they know it at the time. This activity can only be concluded through the personal interaction between the end user and a member from the project team. These interactions need to successfully and effectively transfer knowledge between the two members, and is the very foundation of the success of the project. Project managers can in fact bring a project to completion on time, within budget, and on schedule, with all of the functionally that was documented in the requirements analysis phases only if they clearly understand the original requirements and do not dilute them due to poor knowledge exchange. If the requirements are misinterpreted, become diluted or changed because of the poor transfer of knowledge anywhere within the end-to-end process, and the end user does not utilize the project outcome, the project has, without a doubt, failed. One must understand and be effective in articulating and transferring the knowledge surrounding all of the end product or solutions requirements.

The outcome of this research is the refinement of a model to assist with the knowledge transfer of project requirements. The model can be utilized wherever information and knowledge needs to be communicated and moved from one entity to another. This final chapter provides the solution to the problem statement via the knowledge management overlay model, and contributes to the project management and systems development
body of knowledge through the development of a knowledge transfer method that can be utilized in the real world.

Following the coursework, the research literature review delved into a number of project management domains such as the project life cycles. The literature review illustrated a number of project management methodologies such as waterfall and agile software development. I also used the foundation of knowledge management, knowledge transfer and Szulanski’s sticky knowledge theory to shape this thesis’ knowledge management overlay model.

I used both an inductive and deductive approach that incorporated exploratory surveys and focus groups comprising of business analysts, project managers, software developers, trainers and subject matter experts, both within the authors work environment, as well as outside the studied organizational unit.

The first exploratory research was conducted with 14 subjects all with project backgrounds specializing in their field of expertise such as subject matter experts, business analysts, trainers, software developers and software testers, and various team members. All of the participants were able to provide valid and legitimate feedback to the questions posed. The research was of the impact to senior management and their motivation on their employees from a knowledge transfer perspective. An exploratory survey was employed to gather responses on specific questions, and a focus group was convened to discuss both the positive and negative motivation to both accept change and learn new skills. Feedback included “management needs to promote and encourage employees to take these courses” and “training support is essential”. The complete output of the exploratory survey is located in Section 4.3.2. The results of the survey presented by the researcher strongly suggest that senior managers do have a significant impact on learners’ positive and negative motivation for learning and knowledge transfer.

The problems and opportunities for project success and the barriers to project success results are examined in Section 4.4.1 and illustrated in Figure 4.3. The observation and
reflection of a unique team of innovators working on a new solution is illustrated in Section 4.7 through 4.12.

The second exploratory study was a focus group examining the problems and opportunities for project success and the barriers to project success. The results validated that knowledge transfer through the project life cycle was indeed problematic and specifically correlated to user requirements.

Chapter 4 ends with observation and reflection of a unique team of innovators working on a new solution for their customer code named Innovational, as illustrated in Section 4.1.3. I observed that this unique group would need to embrace new ways of thinking and have the ability to successfully communicate and transfer new knowledge. I then linked my observations back to accepted theories related to knowledge management, motivation, trust, and creativity to gain a rich understanding of the topic of research and to gain insights from project practitioners that led to my development of the knowledge management overlay model.

Chapter 5 addresses the second research question asked in Section 1.6 with the research results rationalized in Section 5.5 and specifically Table 5.2. The final case study as illustrated in Chapter 5 addresses the second research question asked in Section 1.6, with the research results rationalized in Section 5.5 and specifically in Table 5.2. This focus group, with a small group of specialized trainers within a skunk works team, was used to gain insight and understanding on both the successful and unsuccessful tacit knowledge transfer within a real world environment, that addresses the second research question asked in Section 1.6 being, how does the removal of the barriers to knowledge transfer, and the enhancement to knowledge transfer, ensure that customer requirements meet customer expectations and reduce the negative impact to project time, cost, system functionality and schedule. The discussion analysis was interpreted through three sources of data: responses from the focus group meetings, the follow-up survey, and direct observation of the participating researcher. The output of the focus group was then correlated with the other surveys and observations, and linked to current theories of
knowledge transfer, and was then input for the knowledge management model depicted in Figure 8.1.

Figure 8.1 - Knowledge transfer model process

Output from Chapter 5 is established in Table 5.2, learning process analysis, Table 5.3, Linkages between sticky knowledge and case study results, and Figure 6.1, the sticky knowledge transfer model. The model is also described and depicted in Chapter Section 7.4 and illustrated here in Figure 8.2.
8.3 Original Contribution

The validation of results of this thesis reported upon in Section 7.4 provides evidence that the model and approach to its application will advance the project management and general management field by providing project teams, trainers and facilitators with an imported method for transferring knowledge for complex project requirements. This thesis can be considered a ‘how to guide’ with respect to maintaining the integrity of data, information and knowledge, as it is passed from human to human in a project management environment. This thesis complies with the DPM objectives of generation and development of both practical and useful ideas that improve the overall practice of project management. This research can be considered to introduce a small but significant transformation to the field of knowledge management within a project domain, and it can
also be expected that more wide ranging changes can be derived over time based on this thesis. The knowledge management model can also be used to improve the overall exchange of all data, information and knowledge, to adjoining disciplines outside of the project team, such as periphery stakeholders, political leaders and government lobbyist groups and the general public for the competent exchange of knowledge pertaining to the project.

Original contributions were also made in the form of publications that I presented at conferences and in peer reviewed journals that are listed at the beginning of this thesis.

A further, and not insignificant, contribution this has made has been in my own journey of professional development that was enhanced by the DPM study process, and this is evidenced by my tutoring and teaching undertaken as part of my portfolio of career activities.

8.4 Acknowledged Limitations to this Thesis

The first acknowledged limitation to the thesis is that the research was conducted in North America, and all participants were located in Canada and the United States and so the culture of multitasking and extent of reliance on technology may be quite different in other societies which rely on more face-to-face human contact for communication, however, it may be true to assume that modern societies are more generally moving toward multitasking, not away from it. The modern project management discipline, at least within North America and within cultures that embrace this technological adoption stance, has instilled a belief that those who are multitasking are perceived to be doing more work (and possibly doing it more effectively), however, findings and discussion presented in Section 6.2. strongly suggest, and to a degree, proves that multitasking reduces productivity. As noted in the expert panel review in Section 7.4, a number of comments provided by practitioners suggest that there are now more distractions through multitasking within our current business environment than may have been the case many years ago. See Appendix M for complete list of reactions from the validation exercise.
The action research interviews were conducted solely by the author. The participants involved in the surveys and focus groups were all from the project management and business analyst’s domain and were responsible for executing on project deliverables. This means that some limitation of potential bias must be acknowledged, however, because this thesis must be the work of an individual person, despite taking measures to proactively limit bias, my experience and my ontological perspective unavoidably colours the thesis outcome.

8.5 Further Research Opportunities

As illustrated in Section 8.4, there are limitations to the thesis. These limitations provide the following opportunities to build upon for further research in the field of knowledge management, and knowledge transfer. These can be summarized as follows, to:

- Characterize outcome profiles for intangible project outcomes;
- Characterize outcomes for financial impacts;
- Apply the model to dissimilar projects with atypical goals;
- Extend the scope of this study to different industries that utilize project management methodologies; and
- Extend the scope of this study to different countries and cultures that utilize project management methodologies

8.6 Concluding Remarks

The knowledge management model, under a pragmatic action learning paradigm, is helpful to others as a useful starting point with relevance and an approach that others can adapt, according to their context. The goal of the model is to disarm conflicting objectives of customer needs, and augment the success of the project’s timelines, budgets and final solution.

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The knowledge management model, its research completed by the author and vetted with project management practitioners, has a practical place in the project management body of knowledge, and in the practical real world of project management.

8.7 Chapter Summary

This chapter has briefly discussed a summary of the thesis, linking the research questions and objectives, and linking them to the data presented from a number of surveys and focus groups. The findings and model address a need that is currently not addressed in the project management body of knowledge. The value of the knowledge management model, for the practitioner, is the ability to ensure understanding between project team members and key stakeholders, and ensure the soundness, reliability, accuracy and dependability of the project data, information and knowledge, as it is passed between various actors. The knowledge management model, under a pragmatic action learning paradigm, is helpful to others as a useful starting point with relevance and that others can adapt this approach according to their context. The goal of the model is to disarm conflicting objectives of customer needs and augment the success of the project’s timelines, budgets and final solution.

The insights that have come with this thesis do not preclude that future research on the topic, utilizing this model as the point of departure for further research, to gain an even deeper understanding and consideration of the complexity of human knowledge transfer.
References


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Appendices for Chapter 1

**Appendix A DPM Core Courses and linkage to this thesis**

Progress through the DPM Program

<table>
<thead>
<tr>
<th>DPM Core Course</th>
<th>Outcomes</th>
<th>Link to this thesis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leadership</td>
<td>The assignments for this course work were group and individual papers. Each of the students contributes a case study from their work environment and experience. This was an extremely collaborative effort with a cross pollination of thoughts and ideas. This gave the students a starting point for reflection on projects success and failure and the reasons why as well as gaining understanding into how project leaders strategically realize projects and facilitate and represent stakeholder management.</td>
<td>This course work gave linkages to the impact of leadership and their behavior in the success or failure of the employees and the broader organization. It also gave me insights into the impact leaders have on employee motivation and the results of this motivation (both good and bad)</td>
</tr>
<tr>
<td>Procurement and Ethics</td>
<td>The assignments for this course work required both group and individual papers to be submitted. This course was to give the student the understanding of the meaning of delivering best project value and the procurement option available for today's project managers. The course also gave a view into joint venture arrangements. The course also gave understanding to the role of ethics within the project management domain.</td>
<td>I exploited this course to gain a sense of outsourcing and partnering as well as the relationships and behaviors that go along with them. The linkage to the thesis is the discussions and research on “trust”. One of the goals of the survey that was undertaken for this thesis was investigating the issue of trust with senior management in a project environment.</td>
</tr>
<tr>
<td>Project Management Practice</td>
<td>The assignments for this course work was group and individual papers. This provides the student with the option of working on an elective work that complements the students thesis work.</td>
<td>This course saw the publication of a paper discussing Information Communication Technology (ICT) with a project framework to ensure that knowledge is stored and made available to project team members. This paper gave a point of focus for this thesis with respect to knowledge storage.</td>
</tr>
<tr>
<td>Knowledge Management</td>
<td>The assignments for this course work was group and individual papers. The course gave the student the understanding in knowledge transfer via SECI cycle and sticky knowledge. As well the course articulated how knowledge is an strategic asset and how to exploit that knowledge. The course also touched on innovation and creativity in a project environment.</td>
<td>The foundation and inspiration of the thesis came from this focused course work. As I reflected on the readings and course work my problem statement came into clear focus in my mind. From the approach of knowledge transfer the problem statement for this thesis came in the form of how knowledge transfer and management can positively impact such activities as problem solving and project requirements management.</td>
</tr>
<tr>
<td>Reflection</td>
<td>The reflective course associated with each of the courses above where used for the student to synthesize existing knowledge with the newly gaining knowledge to ultimately acquire new insights and knowledge. This involved a number of readings and assignments.</td>
<td>From the reflective learning I was able to bring together academic research and studies and merge into my 30 years of experience in the business world. By integrating theory and practical experience I was able to form abstract concepts and test them in the real-world.</td>
</tr>
</tbody>
</table>
Appendix B Risk Taxonomy Process Flow

Taxonomy-based Risk Identification
Appendix C Risk Taxonomy

Risk Taxonomy

Legend
Click on the Class to see the associated Elements
Click on the Element to see the associated Attributes
Place your cursor over the Attribute to see a description
Click on “Risk Taxonomy” to see the entire Taxonomy

Appendix D Ethics approval document

### 2006

**Application for ethics approval of research involving human participants**

1. This form is to be used by Masters, PhD and academic staff undertaking research in the ‘Risk level 1’ and ‘Risk level 2’ categories as described in the accompanying guidelines. All applications must be completed by filling out this form in its electronic version and printing it out. ‘Risk level 3’ applications must be completed on the RMIT Human Research Ethics Committee form available at [http://www.rmit.edu.au/council/hrec](http://www.rmit.edu.au/council/hrec)

2. This form is available through research administrative staff in your school or on your school web page. Please insert the version number and date in the footer of the document.

**Section A: Approvals and declarations**

**Project Title:** “Ameliorating Project Knowledge Transfer, Technology Distribution and Use - A Canadian Telecom Illustration"

<table>
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<th>Research Degree</th>
<th>Staff Research Project</th>
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<td>Complete this column if you are undertaking research for a <strong>research degree</strong> at RMIT or another university (Masters/PhD)</td>
<td>Complete this column if your research is not for any degree.</td>
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<table>
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<tr>
<th>Investigator</th>
<th>Principal investigator</th>
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<tbody>
<tr>
<td>Name: David G McKenna</td>
<td></td>
</tr>
<tr>
<td>Student No: 3121354</td>
<td></td>
</tr>
<tr>
<td>Qualifications” MSc., PMP</td>
<td></td>
</tr>
</tbody>
</table>
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Phone: 519-434-2905

Email: david.mckenna@bell.ca
S3121354@student.rmit.edu.au

Degree for which Research is undertaken: Phd

<table>
<thead>
<tr>
<th>Senior Supervisor</th>
<th>Other investigator/s</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name: Derek HT Walker</td>
<td>Name/s:</td>
</tr>
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</table>
| Qualifications:
PhD, MSc, Grad Dip (Mgt Sys)
School **School of Property, Construction and Project Management** | Qualifications: |
| Email: derek.walker@rmit.edu.au | School: |

2. **Declaration by the investigator(s)**

*I/We, the undersigned, accept responsibility for the ethical conduct of the research detailed below.*

Signed: David G McKenna Date: 12 July 2006

(Signature of investigator)

Signed: __________________________ Date: __________________________

(Signature of senior supervisor if applicable)
3. Declaration by the Head of School/Centre

The research project set out in the attached application, including the adequacy of its research design and compliance with recognised ethical standards, has the approval of the School/Portfolio. I certify that I am prepared to have this project undertaken in my School/Centre/Unit.

Signed: __________________________ Date: __________________________
(Signature of Head of School or approved delegate)

Comments:

School/Centre: __________________________ Extn: __________________________

Section B: Project particulars

NB: The numbered bolded headings in this form must remain in your completed application for ethics approval. Please leave these headings and delete the detailed guidelines as you go through and complete the form. If a heading is not relevant write ‘Not applicable’ underneath it.

1. Title of Project

“Ameliorating Project Knowledge Transfer, Technology Distribution and Use - A Canadian Telecom Illustration”

2. Project description:

This study is intended to exam and demonstrate best practices to improve the project knowledge sharing from a Knowledge Management, Leadership and Project Procurement perspective. The broader full-scale study will include a quantitative survey approach as well as a qualitative study by interviewing receivers of training, the Train the Trainers (TTT) and senior levels of management. The research approach will be a combination of focus groups, unstructured interviews for feedback, written anonymous written surveys and an action learning approach.
Organizations are beginning to recognize and appreciate that knowledge sharing and knowledge management not only fosters better communication, idea sharing, and solution resolution but it can also give the firm a competitive advantage within their existing market segments. The question that arises is why is it so difficult to transfer tacit knowledge? What are the barriers that impede tacit knowledge transfer and what enables the transfer of knowledge? This research will predominately examine a large telecommunication firm in Canada that accommodates a small team of trainers within the organization that are charged with the transfer of knowledge to a larger number of job performers. This Community of Practice (CoP) has had significant success with their endeavour to transfer knowledge from the process creators to the actual job performers. This CoP is a small, firmly integrated group that are in a contained and controlled environment. Note: a number of other industries will be part of the survey to ensure validity of the thesis.

The transfer of knowledge is not an uncomplicated or straightforward undertaking. Nevertheless it can be overcome with a concentrated effort by both the management and the job performers using CoPs and giving time for the transfer of tacit as well as explicit knowledge. The benefits for an organization in this case are twofold. The first is actual job performers are trained to a very high-level letting them perform their jobs quickly, correctly and competently. This transfers into increased productively, reduced re-work and lower customer agitation due to incorrect work. Second, the organization benefits overall as this unique knowledge is disseminated across a small group, then a large group then across the organization. This second advantage is transferred into a competitive edge that the firm can leverage to win customer satisfaction and maintain existing customers.

3. Research timetable

Research activities will be undertaken intermittently in between August 2006 to November 2008.

4. Research funding
Section C: Details of participants

NB: The numbered bolded headings in this form must remain in your completed application for ethics approval. Please leave these headings and delete the detailed guidelines as you go through and complete the form. If a heading is not relevant write ‘Not applicable’.

1. Number, type, age range, and any special characteristics of participants

   This will be a pilot scoping research study is intended to understand and exploit best practices to augment the transfer of knowledge. The participants are resources that currently work in an innovative environment that requires significant training due to the many changes made to their environment due to the constant influx of technological change. The target sample group will be both management and non-management that are currently working in the (predominately) telecommunications industry.

2. Source of participants (attach written permission where appropriate)

   Some of the senior managers, trainers and job performers that will be interviewed will be either known to the principal investigator or will be referred by other groups known to the principal investigator (I.e. via Students of Project Management Specific Interest Group (SIG) see: http://www.pmi.org/info/default.asp). Formal written permission will be sought and an explanation of the purpose aim and anticipated extension to this project will be fully explained.

3. Means by which participants are to be recruited

   Participants will be personally contacted individually, initially by email or phone, and asked whether they are willing to participate in the research. Confidentiality will be maintained in any write up of data gathered through using pseudonyms or position and not referring to them by name i.e. Manager ‘A’ Organisation ‘A’ etc

   We will not seek names or other identifiers of ‘key’ people that will be the subject of the study (the key talent) to avoid any risk of these companies revealing who their key talent are who may subsequently be poached.

4. Are any of the participants ‘vulnerable’ or in a dependent relationship with any of the investigators, particularly those involved in recruiting for or conducting the project?

   None.

Section D: Estimation of potential risk to participants and project classification
1. **Please identify the project classification by assessing the level of risk to participants**

   Risk level 2

2. **If you believe the project should be classified category ‘Risk level 1’ or category ‘Risk level 2’ please explain why you believe there are no risks or minimal to the participants.**

   Research for this project could be assessed as risk level 2 because the individual identity of the participants will not be disclosed in the final paper/dissertations. Responds from research will be described as representative of special characteristic at a group level and not on individual level.
3. Please detail any other ethical issues which may be particularly associated with this project.
N/A

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td>Does the data collection process involve access to confidential data without the prior consent of participants?</td>
<td>X</td>
</tr>
<tr>
<td>If ‘Yes’ please give details of any actions you will take to ensure that participants are not compromised by this:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b)</td>
<td>Will participants have pictures taken of them eg, photographs or videos?</td>
<td>X</td>
</tr>
<tr>
<td>If ‘Yes’ please give details of any actions you will take to ensure that participants are not compromised by this:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c)</td>
<td>If interviews are to be conducted will they be tape-recorded?</td>
<td>X</td>
</tr>
<tr>
<td>NB if interviews are being conducted please attach a list of proposed interview questions/themes to this application.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>If ‘Yes’ please give details of any actions you will take to ensure that participants are not compromised by this:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transcripts will be dealt with as coded by Participant A, B etc and a single list of ‘real’ identifiers of those interviewed will maintained separately. It will not be necessary and will not be sought, that the key talent (people) recruited will be identified. The study is about an HRM process and not individuals</td>
<td></td>
<td></td>
</tr>
<tr>
<td>d)</td>
<td>Are the participants in a dependent relationship with the investigator/s?</td>
<td>X</td>
</tr>
<tr>
<td>If ‘Yes’ please give details of any actions you will take to ensure that participants are not compromised by this: participants will be given the opportunity to participate or not participate. The surveys will be WEB based and anonyms.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>e)</td>
<td>Is deception to be used?</td>
<td>X</td>
</tr>
<tr>
<td>If ‘Yes’ please give details of any actions you will take to ensure that participants are not compromised by this:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>f)</td>
<td>Do you plan to use an interpreter?</td>
<td>X</td>
</tr>
</tbody>
</table>
If ‘Yes’ please give details of any actions you will take to ensure that participants are not compromised by this: A minor component of the sample group will be French speaking – all correspondence to be completed in French will be translated by a professional translator and discussed prior to release to the sample group to ensure compatibility between the themes and ideas of both the French and English survey.

g) Does the research involve any tasks or processes which participants may experience as stressful or unpleasant during or after the data collection?

If ‘Yes’ please give details of any actions you will take to ensure that participants are not compromised by this:

h) Does your research involve the participation from anyone from an ATSI (Aboriginal and Torres Strait Islander) community?

If ‘Yes’ please give details of any actions you will take to ensure that participants are not compromised by this:

i) Are there in your opinion any other ethical issues involved in the research eg is it possible that you will be collecting/disclosing information about a third party not involved in the research?

If ‘Yes’ please give details of any actions you will take to ensure that participants are not compromised by this:

---

### Section E: Informed consent

NB: The numbered bolded headings in this form must remain in your completed application for ethics approval. Please leave these headings and delete the detailed guidelines as you go through and complete the form. If a heading is not relevant write ‘Not applicable’ underneath it.

1. **Attach to your application**

   (a) a copy of the letter to participants providing plain language information about the research. This will often be the letter inviting people’s participation. This should normally be on RMIT letterhead. (see attached guideline for the Plain Language Statement (PLS) at Appendix 3)

   (b) a copy of the Consent form (see Appendix 1) for research participants. If you are not obtaining consent in writing please explain why.

2. **Dissemination of results**
Participants should be informed that results from the study may appear in publications. This information is to be included in the information given in the Plain Language Statement prior to obtaining informed consent.

Section F: Research Involving Collection, Use Or Disclosure Of Information

Please note that if you propose to collect information about an individual from a source other than the individual, or to use or disclose information without the consent of the individual whose information it is, you will also have to complete the Special Privacy Module (download from the Web from URL) as well as the questions below.

Under statutory guidelines a HREC may approve some research where the public interest outweighs considerations of privacy, however a researcher must make a special case for such approval. The Special Privacy Module is the starting point for preparing such a case.

For a more detailed guidance and definitions for each of the question below, see Notes to assist in completing the form, Section F.

1 Does this Section have to be completed?

Does the project involve the collection, use or disclosure of personal information (includes names and contact details), health information including genetic information, or sensitive information,? (see Notes to assist in completing the form, Section F from http://www.rmit.edu.au/council/hrec)

☒ Yes – you do not have to answer any questions in this section. Go to Section G.
☐ Yes – you must answer questions in this section. Go to Question 2.

Only Name position and Department information, and other general information of those interviewed is sought for contact purposes only. The people involved in the initial survey will be referred to in any findings and consolidation of raw data by an alias or number so that their identity cannot be revealed. Interview data and transcripts will be maintained securely and in confidence at the principal’s home office under lock and key.

2 Type of activity proposed

Are you seeking approval from this HREC for:

(a) collection of information?

☐ Yes
☐ No

(b) use of information?

☐ Yes
☐ No

(c) disclosure of information?

☐ Yes
☐ No
3 **Collection of Information**

(a) Does the project involve collection of information directly from individuals about themselves?

☐ No – (ie -collected from a third party/existing records) You must fill out the Special Privacy Form (download from the Web from URL) as well as this form.

☒ Yes – answer the following questions:

(b) What type of information will be collected? (Tick as many as apply)

☐ personal information (eg name, contact details etc)

☐ sensitive information (eg affiliations, income values, attitudes etc)

☐ health information

(c) Does the plain language statement explain the following:

The identity of the organisation collecting the information and how to contact it?

Yes ☒ No ☐

The purposes for which the information is being collected?

Yes ☒ No ☐

The period for which the records relating to the participant will be kept?

Yes ☒ No ☐

The steps taken to ensure confidentiality and secure storage of data?

Yes ☒ No ☐

How privacy will be protected in any publication of the information (ie how is anonymity of participants is guaranteed)?

Yes ☒ No ☐

The fact that the individual may access that information?

Yes ☒ No ☐

If you answered “No” to any of these questions, give the reasons why this information has not been included in the plain language statement:


4 **Use or Disclosure of Information About Individuals**

(a) Does the project involve the use or disclosure of identified or potentially identifiable information?
☐ No – go to Question F5.
☐ Yes, answer the following questions.

(b) Does the project involve use or disclosure of information without the consent of the individual whose information it is?
☐ No - go to Question F5.
☐ Yes, You must fill out the Special Privacy Form, as well as this form. (download from the Web from URL

5 General Issues

(a) How many records will be collected, used or disclosed? Specify the information that will be collected, used or disclosed (e.g. date of birth, medical history, number of convictions, etc)

<table>
<thead>
<tr>
<th>Number of records:</th>
<th>????????</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of information:</td>
<td>see above</td>
</tr>
</tbody>
</table>

(b) For what period of time will the information be retained? How will the information be disposed of at the end of this period? For the statutory 5 years

(c) Describe the security arrangements for storage of the information. Where will the information be stored? Who will have access to the information? The information will be stored securely in a locked cabinet in the principal investigator’s home office. Only the principal investigator will have direct access.

(d) How will the privacy of individuals be respected in any publication arising from this project? Respondents will not be named or directly identified.

(e) Does the project involve trans-border (i.e. interstate or overseas) data flow?
☐ Yes ☐ No

If Yes, give details of how this will be carried out in accordance with relevant Privacy Principles (e.g. HPP 9, VIPP 9 or NPP 9).

(f) Does the project involve the adoption of unique identifiers assigned to individuals by other agencies or organisations?
☐ Yes ☐ No

If yes, give details of how this will be carried out in accordance with relevant Privacy Principles (e.g. HPP 7, VIPP 7 or NPP 7).

6 Adverse Events

Are procedures in place to manage, monitor and report adverse and/or unforeseen events relating to the collection, use or disclosure of information?
☑ Yes ☐ No

Give details.

Any such eventuality will be immediately brought to the attention of the Head of School to deal with according to RMIT procedures prevailing at that time.
7 Other Ethical Issues
Discuss any other ethical issues relevant to the collection, use or disclosure of information proposed in this project. Explain how these issues have been addressed.

Section G: Other issues

NB: The numbered bolded headings in this form must remain in your completed application for ethics approval. Please leave these headings and delete the detailed guidelines as you go through and complete the form. If a heading is not relevant write ‘Not applicable’ underneath it.

1. Do you propose to pay participants? If so, how much and for what purpose?

No.

2. Where will the project be conducted?

The project will be conducted in Canada, predominantly in the provinces of Ontario and Quebec.

3. Is this project being submitted to another human research ethics committee, or has it been previously submitted to a human research ethics committee?

No.

Appendix 1

RMIT HUMAN RESEARCH ETHICS COMMITTEE

Prescribed Consent Form For Persons Participating In Research Projects Involving Interviews, Questionnaires, Focus Groups or Disclosure of Personal Information

<table>
<thead>
<tr>
<th>PORTFOLIO OF SCHOOL/CENTRE OF</th>
<th>Business School of Property, Construction and Project Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name of participant:</td>
<td></td>
</tr>
<tr>
<td>Project Title:</td>
<td>Ameliorating Project Knowledge Transfer, Technology Distribution and Use - A Canadian Telecom Illustration</td>
</tr>
<tr>
<td>Name(s) of investigators:</td>
<td>(1) Prof. Derek Walker</td>
</tr>
<tr>
<td>Phone:</td>
<td>61-3-9925-3908</td>
</tr>
</tbody>
</table>

1. I have received a statement explaining the interview/questionnaire involved in this project.
2. I consent to participate in the above project, the particulars of which - including details of the interviews or questionnaires - have been explained to me.

3. I authorise the investigator or his or her assistant to interview me or administer a questionnaire.

4. I give my permission to be audio taped  □ Yes  □ No

5. I give my permission for my name or identity to be used □ Yes  □ No

6. I acknowledge that:
   (a) Having read the Plain Language Statement, I agree to the general purpose, methods and demands of the study.
   (b) I have been informed that I am free to withdraw from the project at any time and to withdraw any unprocessed data previously supplied.
   (c) The project is for the purpose of research and/or teaching. It may not be of direct benefit to me.
   (d) The privacy of the information I provide will be safeguarded. However should information of a private nature need to be disclosed for moral, clinical or legal reasons, I will be given an opportunity to negotiate the terms of this disclosure.
   (e) The security of the research data is assured during and after completion of the study. The data collected during the study may be published, and a report of the project outcomes will be provided to ____________ (researcher to specify). Any information which may be used to identify me will not be used unless I have given my permission (see point 5).

Participant’s Consent

Name: ___________________________ Date: ___________________________

(Participant)

Name: ___________________________ Date: ___________________________

(Witness to signature)

Where participant is under 18 years of age:

I consent to the participation of ___________________________ in the above project.

Signature: ___________________________ (1) ___________________________ (2) Date: ___________________________

(Signatures of parents or guardians)

Name: ___________________________ Date: ___________________________

(Witness to signature)

Participants should be given a photocopy of this consent form after it has been signed.

Any complaints about your participation in this project may be directed to the Secretary, RMIT Human Research Ethics Committee, University Secretariat, RMIT, GPO Box 2476V, Melbourne, 3001. The telephone number is (03) 9925 1745.
Details of the complaints procedure are available from: www.rmit.edu.au/council/hrec
RMIT HUMAN RESEARCH ETHICS COMMITTEE

Described Consent form for persons participating in research projects involving tests administered to human subjects

PORTFOLIO OF SCHOOL/ CENTRE
Name of participant: 
Project Title: 

Name(s) of investigators: (1) David McKenna 
Phone: 

(2) 
Phone: 

Name of participant: 
Project Title: 

1. I have received a statement explaining the tests involved in this project and I consent to participate in the above project.
2. I authorise the investigator or his or her assistant to use with me the tests referred to in 1 above.
3. I acknowledge that:
   (a) The possible effects of the tests have been explained to me to my satisfaction.
   (b) I have been informed that I am free to withdraw from the project at any time and to withdraw any unprocessed data previously supplied (unless follow-up is needed for safety).
   (c) The project is for the purpose of research and/or teaching. It may not be of direct benefit to me.
   (d) The privacy of the information I provide will be safeguarded. However should information of a private nature need to be disclosed for moral, clinical or legal reasons, I will be given an opportunity to negotiate the terms of this disclosure.
   (e) The security of the research data is assured during and after completion of the study. The data collected during the study may be published, and a report of the project outcomes will be provided to …………….. (researcher to specify). Any information which will identify me will not be used.

Participant’s Consent

Name: Date: 

(Participant) 

Name: Date: 

(Witness to signature)
Where participant is under 18 years of age:

I consent to the participation of ____________________________________ in the above project.

Signature: (1)                                             (2) Date: __________________________

(Signatures of parents or guardians)

Name: __________________________________________ Date: __________________________

(Witness to signature)

Participants should be given a photocopy of this consent form after it has been signed.

Any complaints about your participation in this project may be directed to the Secretary, RMIT Human Research Ethics Committee, University Secretariat, RMIT, GPO Box 2476V, Melbourne, 3001. The telephone number is (03) 9925 1745.

Details of the complaints procedure are available from: www.rmit.edu.au/council/hrec

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Pilot Research Study
Appendix 3

Design and Social Context Portfolio
School of Property, Construction and Project Management

Project Title: Ameliorating Project Knowledge Transfer, Technology Distribution and Use - A Canadian Telecom Illustration

Dear ………………….

My name is David G McKenna a PhD candidate undertaking a research project through RMIT University with my colleague Dr Derek Walker. The title of the research project is *Ameliorating Project Knowledge Transfer, Technology Distribution and Use - A Canadian Telecom Illustration*.

ABOUT THE RESEARCH

Organizations are beginning to recognize and appreciate that knowledge sharing and knowledge management not only fosters better communication, idea sharing, and solution resolution but it can also give the firm a competitive advantage within their existing market segments. The question that arises is why is it so difficult to transfer tacit knowledge?
What are the barriers that impede tacit knowledge transfer and what enables the transfer of knowledge?

This research will predominately examine a large telecommunication firm in Canada that accommodates a small team of trainers within the organization that are charged with the transfer of knowledge to a larger number of job performers. This Community of Practice (CoP) has had significant success with their endeavour to transfer knowledge from the process creators to the actual job performers. This CoP is a small, firmly integrated group that are in a contained and controlled environment.

WHY ARE WE ASKING YOU?

Your organisation is one of the selected target groups that we believe is relevant. The major focus is telecommunication organizations within Canada although there will be smaller target groups outside of the core industry to corroborate the results. Moreover, your company has a reputation as a leading and innovative firm that strategically seeks its markets and matches its human resource strategy to achieve attracting the best available talent to fill positions that provide you with a measure of competitive advantage.

WHAT THE STUDY INVOLVES?

Senior managers, trainers and job performers that will be interviewed, a component of the participants will be either known to the principal investigator or will be referred by other groups known to the principal investigator (I.e. via Students of Project Management Specific Interest Group (SIG) see: http://www.pmi.org/info/default.asp). Formal written permission will be sought and an explanation of the purpose aim and anticipated extension to this project will be fully explained.

Participating in the research is voluntary. You do not have to take part in the research project if you choose not to. We will be pleased to share the results of our research if requested in writing.

YOUR SAFEGUARDS

To protect your confidentiality, all information in all specific forms will not be shared under any condition. The data from the interviews and surveys will have no identifying information that will be released to others. At no time will the name of any individual be revealed or attributed to a specific part of the data.

At anytime during this process, if you are uncomfortable with a question being asked, you can skip the question. You are also welcome to talk about your concerns directly with myself, David G McKenna. If our researchers do not adequately address your concerns, you are free to withdraw your consent and discontinue your participation at anytime without any prejudice.
WHAT HAPPENS TO THE RESULTS?

We will write a report based on the research responses. There may be some conference and journal publications flowing from this work, where the identity of the participants and organisation will be kept confidential. A copy of the research report will be given to:

RMIT University.
You, upon request.

No written report will contain the name of anyone who participates in the research or the name of any company involved in the research.

ABOUT THE RESEARCH – WHO TO CONTACT

If you have any queries, complaints, and concerns or would like more information about this research project, you can contact the research supervisor at the School of Property, Construction and Project Management Professor Derek Walker 61-3-9925-3908 Email: Derek.walker@rmit.edu.au.

Sincerely Yours,
David G McKenna, Chief Research Investigator

Any complaints about your participation in this project may be directed to the Secretary, RMIT Human Research Ethics Committee, University Secretariat, RMIT, GPO Box 2476V, Melbourne, 3001. The telephone number is (03) 9925 1745.
Details of the complaints procedure are available from: www.rmit.edu.au/council/hrec

Appendix E Sample Debrief Letter

Sample Debrief Letter

Thank you for your participation in this study. Your involvement in research is extremely valuable in contributing to the ongoing improvement of theory and practice in the field of organizational behaviour.

This study investigated knowledge transfer by employees at Bell Canada. Although knowledge sharing has received past research attention, other types of knowledge transfer behaviours have received little. Therefore, this study was conducted to distinguish between various types of knowledge transfer behaviours and identify several predictors and outcomes of knowledge transfer in organizations. We believe that different knowledge transfer behaviours will have different effects on people's performance and their intentions to withhold and share knowledge in the future.
Studying knowledge transfer behaviours at work is an important topic. Most employees are, at one time or another, unable or reluctant to share everything they know with coworkers who have requested their assistance. This may create problems for employees who need to "reinvent the wheel" or learn from experience when a few words from a colleague could have saved them time and effort. Managers may assume that the necessary climate and systems are in place to foster knowledge transfer but managers may actually have trouble assessing the true extent of knowledge transfer behaviours. As a result it is difficult to determine if necessary information is making it to the people who need it in a timely manner.

Our research thus far has indicated that people engage in different types of knowledge transfer strategies depending on the situation. For example, people may "play dumb" if they wish to withhold information from someone, they may meet with someone face-to-face and fully detail all of the information requested of them, or they might find that hurdles are used to rationalize why they were unable to access the information they require. This study was designed to further examine the different types of knowledge transfer behaviours, as well as how these behaviours related to important employee outcomes. For example, we wanted to explore whether "knowledge sharers" are better or worse performers than those who do not share their knowledge. We will use the information that we gathered from this study to offer specific recommendations for enhancing knowledge transfer at Bell Canada. Please remember that all of the information you provided is completely confidential and any recommendations we make will be based on aggregated data. Your responses were completely anonymous and there is no way that you can be identified in the results.

Thank you for your participation in this study, and for taking the time to carefully read and understand this debrief letter. The academic research process is critical to the ongoing improvement of organizational life, and without the support of individuals like yourself who volunteer as subjects for these studies, new knowledge would not be discovered.

Sincerely,
Appendix F Survey results

You have been selected for a short two question survey regarding the training programs within your firm. This survey should take less than ten minutes to complete. The two questions relate to the influence that senior management have or have not on training programs within your firm. Take a moment and reflect on senior management’s impact on training in your work environment. Reflect on if senior management encouraged continuous learning and training? Do they support long-term training? This survey is anonymous and the results will be used in academic research as well as to improve the training programs within your firm.

<table>
<thead>
<tr>
<th>Questions</th>
<th>How should senior management administer overall training in your firm/district/section?</th>
<th>How are senior managers administering overall training in your firm/district/section?</th>
<th>Industry you currently work in:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Senior management should help employees develop their Individual Development Plan with a focus on enhancing or learning new skills that will benefit the company and help the employee grow. Senior management should also allow for training opportunities during the normal work hours so employees don’t have to rearrange their schedules just to attend company sponsored training classes. We have an excellent training curriculum but senior management needs to promote and encourage employees to take these courses.</td>
<td>Senior management does not promote the training curriculum that is offered by our company.</td>
<td>Information Technology</td>
</tr>
<tr>
<td>2</td>
<td>Based primarily on the needs of the customer followed by needs of the individual.</td>
<td>Gaps in knowledge necessary to meet and support customer systems.</td>
<td>Education</td>
</tr>
<tr>
<td>3</td>
<td>Senior management should take the view that good training is investing in the employees and this will have a positive impact on their morale. And ultimately reflect on the bottom line.</td>
<td>Our senior administration supports in house training and supports tuition reimbursement for higher education. I think this is how is should be. But our organization is departmentally oriented. A lot</td>
<td>Health Care</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
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<td>---</td>
</tr>
<tr>
<td>4</td>
<td>Based on needs of the business.</td>
<td>Depends on the support from your particular supervisor or department head.</td>
<td>Telecom</td>
</tr>
<tr>
<td>5</td>
<td>Depending on what type for training, my answer is maybe...I believe that training should be done by the Resource Associates of that department as they are the ones who work closely with the job performers</td>
<td>They use &quot;Documentum&quot; software which is very cumbersome and most people in our group do not use this system thus we are not up to date - PCN (product change notices) are sent out to everyone even if the info does not pertain to us - should only be sent to people requiring the info</td>
<td>Telecom</td>
</tr>
<tr>
<td>6</td>
<td>There should be more structured training i.e. thru the CDC, more on line courses - there should be more technical training. I work in the IP Factory/Garage and have no technical knowledge on how the network works once it hits the CO i.e. esm/esu, IP enabling and other green room activities - there should be one communicating tool for training</td>
<td>When budget cuts are required, training is the first to be restricted and/or removed.</td>
<td>Telecom</td>
</tr>
<tr>
<td>7</td>
<td>They should look at the candidates they feel have the ability to be promoted and plan a course of action that will insure the candidate receives the proper training in a timely manner.</td>
<td>Corporately, there continue to be new directions in training developed. In addition to this, my immediate leader is involved in helping me define my career and select the appropriate training path.</td>
<td>Telecom</td>
</tr>
<tr>
<td>8</td>
<td>Ideally, they should be involved in shaping the strategy of the business, defining the roles within the company/district and then assisting employees in defining their career paths within the sphere of what has been defined. They should be as actively involved in training as employees are.</td>
<td>Not sure if they are in any way involved?</td>
<td>Telecom</td>
</tr>
<tr>
<td>Page</td>
<td>Text</td>
<td></td>
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<tr>
<td>------</td>
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<td></td>
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</tr>
<tr>
<td>9</td>
<td>make sure all groups receive adequate training by ensuring people who are knowledgeable about a JPs function are involved in developing training. Make sure enough resources are provided so training doesn't impact production too much.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>some districts have training councils, or training boards which partner with srn management for stakeholder direction, funding, etc.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| 10   | snr mgmt should develop annual training strategies, standards / benchmarks for the Department/Districts in partnership with:  
- corporate HR (to identify mandatory employee training such as code of ethics, security, and to ensure new courses available to provide right skills training to meet new corporate strategies, culture)  
- New Technology and other Planning and Marketing teams to deliver timely training (technical and admin) required to meet business unit demands (for new technology deployment, for implementation of business plans and directives)  
- Industry training primes and partners to obtain updated and applicable courses to meet Bell employee career planning (eg Leadership skills)  
- Training Centre (CDC) to ensure technical and tool courses still available to support existing and future Bell tools (eg ensure Microsoft basic and advance courses available to support current desktop / laptop configuration (win nt and office 2000 etc) currently Office 2000 courses not available yet whole districts of employees have these tools on their desktops)  
- Business Unit Training Boards to gather and identify District and Section requirements annually  
- Budget primes (Corporate, Department, Business Unit etc) to ensure adequate funding allocated in annual budget(s) meet all training requirements. |
<p>|      | They aren’t, even if a training plan/objective is approved, each submission must be re-approved on its own. Makes generating a plan and getting approval redundant. |</p>
<table>
<thead>
<tr>
<th>11</th>
<th>corporate mandatory, job and tool specific and career development training plans.</th>
</tr>
</thead>
</table>
| 12 | 1. Ask for a training plan that includes development objectives for all employees within the group.  
2. Review plan with managers to ensure that it fits within the group plans.  
3. Approve the training plan which will include all components  
4. Request approval requirements for only changes to the original approved plan.  
5. Request a report of progress and costs measured against the plan  

Support within a section is deterring at times. Most of the time we have $X allocated per employee. Therefore once you use your amount you are done for the year, regardless of any succession planning or future development that you would like to perform and that you are demonstrating the interest. At a section level, sometimes the view on training is that we need to take as many courses as possible so that we max out on our allocation - although how the courses are selected or dictated does not necessarily reflect specific growth plans, rather it is an attempt to spend the allocation $. I think time needs to be taken to ensure that training is made available as required, and wanted, depending on the individuals growth plan. Time needs to be spent laying this groundwork in order to fully develop and continue to increase the performance of our employees. |

Training support is essential and it is support that must be occurring at all levels in the firm. Appropriate training for a high performance culture, in my opinion, would involve support beyond simply "Bell Internal Courses". There are significant opportunities for development outside of Bell although this is funding that is usually cut if expenses are high. |
Ensuring that the best and most suited suppliers are delivering the courses. Location is important need to make available in centers as well as Toronto and Montreal. ex London. There are many seminars Power Within etc that should be encouraged and budgeted for, they are amazing development and recognition events.

Very well. My only concern is that we sometimes have to organize our own London session for courses that should have been made available here. I have no trouble being supported in my development needs.

This should be done live and in person if possible. equally amongst all the associates involved targeting appropriate associates selecting appropriate trainers.

Disorganized - travel arrangements never made in a timely fashion for trainers. rooms not booked. Trainers not always clear who and what they are training. Gap between needs of associates and training team.

Appendix G Survey 1.1

<table>
<thead>
<tr>
<th>What problems, difficulties or constrains do Business Analysts have gathering system requirements?</th>
<th>What negatively impacts a project scope?</th>
<th>What inhibits the transfer of knowledge from Marketing through to Technology, the Project Team, Business Analysts, Developers, and to the Customer?</th>
<th>What inhibits the ability of S/W testers to code system requirements?</th>
<th>What inhibits the planning phase of S/W projects?</th>
<th>What is your role in the Systems Development/Project Management processes? (i.e. Project Manager, S/W Developer, etc.)</th>
<th>What industry aspect inhibits your ability to do your job?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of detail from clients</td>
<td>Improperly stated/incomplete requirements</td>
<td>Lack of knowledge of some systems</td>
<td>Time pressure</td>
<td>Missed requirements</td>
<td>Different 'lingo' used by each group</td>
<td>Time pressures</td>
</tr>
<tr>
<td>Improperly stated/incomplete requirements</td>
<td>Clients adding new requirements</td>
<td>Poor listening</td>
<td>Improperly stated requirements</td>
<td>Missed requirements, due to lack of understanding of systems</td>
<td>Missed requirements</td>
<td>Overall Business Analyst - termed &quot;Solution Prime&quot;</td>
</tr>
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<td>Missed requirements</td>
<td>Missed requirements, due to lack of understanding of systems</td>
<td>Overall Business Analyst - termed &quot;Solution Prime&quot;</td>
</tr>
</tbody>
</table>

Lack of detail from clients

Improperly stated/incomplete requirements

Lack of knowledge of some systems

Time pressure

Missed requirements

Different 'lingo' used by each group

Different perspectives of each group

Poor listening

Improperly stated requirements

Missed requirements, due to lack of understanding of systems

Overall Business Analyst - termed "Solution Prime"
<table>
<thead>
<tr>
<th>Time, access to knowledgeable resources, seeking clarity across conflicting requirements, and balancing the needs of the business requirements within the constraints of the technical limitations.</th>
<th>Conflicting projects, unclear requirements, limited funding, aggressive date constraints.</th>
<th>Transfer knowledge is inhibited when individuals representing the different domains are unable or unwilling to learn more about the other domains for the benefit of the customer.</th>
<th>Coding system requirements require specific technical skill sets that many S/W testers do not have.</th>
<th>Effective planning of S/W projects can only be done when the project manager and/or the team members understand the process of project planning and/or the bigger picture of a business's objectives. If a S/W project is managed by a technician who does not have this understanding, then the team often starts directly with coding rather than planning.</th>
<th>I am currently a full-time graduate student, though I have 20 years of experience as Program Manager, Manager of PMO, Project Manager, S/W Developer, etc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Existing business processes defined by tools not by the logic</td>
<td>Diffuse vision of the customer, what tasks to be solved. Organizational changes are not included in project scope.</td>
<td>Marketing promises features, which are technical not possible.</td>
<td>Requirements authors do not/not sufficiently include testers (test environment) in requirements creation.</td>
<td>Schedule is defined by Marketing or Management. Should be defined by the planning team.</td>
<td>Project Manager</td>
</tr>
<tr>
<td>Ensuring that they adequately capture the requirements as conveyed by the customer and that these are then captured with sufficient detail and clarity in order for a system designer or developer to take it to the next step.</td>
<td>Poorly specified requirements Missed requirements Misunderstood requirements Additions to requirements</td>
<td>Lack of ability to accurately communicate</td>
<td>S/W testers should not be coding system requirements. They should be testing the developed code!!! (Is this question correct?)</td>
<td>Lack of knowing what is needed and how it will be achieved.</td>
<td>Project Manager</td>
</tr>
<tr>
<td>I have been employed.</td>
<td>Safe systems IT within academia.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brought into the project process too late</td>
<td>Sponsor changes scope too many times, impacts the resources being brought on at the wrong time</td>
<td>I would say too many changes in project scope during the project life cycle.</td>
<td>NA</td>
<td>Processes that must be followed, waste of time</td>
<td>Project Manager</td>
</tr>
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<td>---</td>
</tr>
<tr>
<td>a. Limited knowledge of the most appropriate analysis technique for the types of system requirements being gathered; e.g., trying to use only Use Cases for identifying system requirements.</td>
<td>Actually, the problem is often the opposite: the transfer of knowledge from the Technology project team back to Marketing so what the customer has heard is being developed and what the customer eventually receives is consistent. As a customer, I have often had to insist on speaking to the Technology Project Team directly myself instead of only receiving answers from Marketing because the Marketing people have insufficient technical knowledge to communicate the reality of the product they are trying to market. However, if by “Marketing” you mean “Product Development” (which is not the same thing), that is a different question. The best way to keep Product Development people, the Technology project team, and the Customer on the</td>
<td>Insufficient participation in project planning by key project team members. Too often the project is defined only by the sponsor’s) and a project manager who may not even be the project manager who will eventually execute the project once it has been approved and funded. Project charters of sufficient detail are often missing. Project schedules are often not developed at a sufficient level of detail with key project team members providing feedback before end dates and budgets become commitments. 4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. Insufficient access/participation of key business team members.</td>
<td>Testers do not code system requirements. Testers test software to verify it meets system requirements. Test Cases are used to verify system requirements that are within the project scope are tested. And the Test Cases come directly from the initial system requirements.</td>
<td></td>
<td></td>
<td></td>
<td>IT Organization Development Director, PMO Manager, Program Manager, Project Manager, Change Manager . . . Previously Business Analyst, Programmer, DBA, Tester, Documenter, and Trainer</td>
</tr>
<tr>
<td>c. Not using Facilitated Sessions to gather requirements (business team members do a better job of articulating requirements in a facilitated session than in individual interviews)</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>
same page is through frequent Customer Focus Groups, including allowing Customers to provide feedback including exercising new products very early in their development cycle; e.g., even before alpha or beta testing.

<p>| Not being involved at the BRS session (due to PTP constraints) results in missed information that is helpful when developing System Requirements | Sponsor/Team unclear about what is in and out of scope. It is necessary that this is mailed down (at least 90%) before the BRS session. After the BRS session, the scope should be 100% agreed on. | Not sure about this one... | poor system requirement definition (Unclear, misunderstood requirements) | Lack of direction by the sponsor, inability to answer questions in a knowledgeable manner. | Lead Business Analyst (a.k.a. BA of the Future/BA Evolution) | Telecommunications |</p>
<table>
<thead>
<tr>
<th>people don't know what they really want</th>
<th>Scope creep..... little things get added on... or resources get pulled to work more high priority items</th>
<th>Contracts. Marketing says whatever they can to get the deal; doesn't matter if is actually feasible from the technical perspective...</th>
<th>requirements not clear or can be interpreted differently. Testers don't normally code....</th>
<th>time constraints on when estimate needs to be completed. Subject matter experts (SMEs) unavailable when availability is needed</th>
<th>principle PM mentor and Program/Project manager as needed</th>
<th>Solution Provider</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accurately listening to the requirements given without spinning them in their own way.</td>
<td>Not understanding the project or requirements correctly.</td>
<td>Hazy details</td>
<td>The inability to look outside the box from a customers POV</td>
<td>The 3 project constraints, Time, money, quality.</td>
<td>Enterprise Architect.</td>
<td>Telecommunications</td>
</tr>
<tr>
<td>1) Unable to get the right stakeholders at the table. 2) Lack of commitment - dedication of key stakeholders 3) Stakeholders are geographical dispersed and difficult to get together as a team (budget, time)</td>
<td>1) Clear understanding of the Business Opportunity or problem, scope, objectives (with metrics). 2) Lack of traceability between requirements artifacts. 3) Language - Business language versus, system language, marketing language, technical language,</td>
<td>SW testers that code requirements ?? Coders or developers design and code system requirements. Now if you mean what inhibits SW testers to test system requirements ... then 1) Unclear requirements 2) Lack of context to requirements - no Use Case (ability to write test scenarios for Normal, alternate and exception scenarios (instances). 2) Lack of non functional requirements - affects ability to test e.g. Performance</td>
<td>1) Lack of time. PMs and project sponsors wish to have projects completed ASAP and pressure teams. Often this inhibits proper requirement Management and planning. 2) Lack of metrics; metrics to properly estimate (time, cost, quality). 3) Lack of the right, skill and available resources.</td>
<td>1) Opportunities or problem area not well defined or ambiguous. 2) Project scope is too large and vague. 3) Realistic objectives are not set.</td>
<td>Senior Business Analysis</td>
<td>Telecommunications Validation</td>
</tr>
</tbody>
</table>
unclear requirements, all stake-holders and user groups not completely identified, management not willing to acknowledge the vastness of project scope

<table>
<thead>
<tr>
<th>insufficient support by project sponsor or management, lack of sufficient skills in the project team, lack of time for the project or the team members called to perform other tasks, funds being channelled to meet other business needs, all project risks not identified, other market forces</th>
<th>insecurity amongst team members, general mistrust in the organization, lack of support from the management, lack of allocation of time to do the sufficient knowledge transfer, insufficient documentation, high turn-around of knowledge workers</th>
<th>Why would the testing team code?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project manager does not know the need for the project, management wants the solution turned around in shorter time than the project really requires, the project changes hands from 1 manager to another, management not willing to allocate the requisite resources for the planning, the project</td>
<td>Business analyst</td>
<td>Information Technology</td>
</tr>
<tr>
<td>Stakeholders with unclear objectives</td>
<td>Requirements that are not &quot;SMART&quot; (specific, measurable, achievable, relevant, traceable)</td>
<td>Loss in communication flow and different agendas.</td>
</tr>
<tr>
<td>--------------------------------------</td>
<td>------------------------------------------------------------------</td>
<td>-----------------------------------------------</td>
</tr>
</tbody>
</table>

- Stakeholders with unclear objectives: 
  - Requirements that are not "SMART" (specific, measurable, achievable, relevant, traceable) 
  - Loss in communication flow and different agendas. 
  - Interpretation of the business requirements 
  - The unknowns 
  - Project Manager 
  - Telecommunications

- for my company, the business analyst are on the business side so they gather 'business requirements' and not system requirements. We have business system analyst who will then take the business requirements and develop the system requirements working with the BA and developers.

- Reorganizations of company - my project was started in 2005, the company has gone thru a reorg resulting in loss of original project team members. Some were let go from the company, some got new assignments and were pulled off the project. The project oversight was changed as well (sponsor) who felt more scope could be added.

- Not having dedicated BA's to effectively document and communicate the marketing requirements. There is a need for a specialized team that can work with the business areas enough to understand their world then be able to translate that into requirements.

- Business will submit the project 'need' but also try to drive the IT solution.

- project manager - IT

- Business will submit the project 'need' but also try to drive the IT solution.

- Insurance
**Appendix H** Problem and Opportunities Survey Results

### Problems/Opportunities Identified (IP Development Center - Toronto, Ontario, Canada)

**Session results:**

<table>
<thead>
<tr>
<th>Category</th>
<th>Problems/Opportunities</th>
<th>Possible Solution</th>
<th>Issued Raised by</th>
</tr>
</thead>
<tbody>
<tr>
<td>rqmt's</td>
<td>Projects are delayed due to late rqmts</td>
<td>Recommend that a developer with business background is involved in the Conceptual solution session to ensure that what the team is conceiving of is actually possible for a system perspective. The developer also gains insight into the needs of the project team (from a development perspective).</td>
<td>PL</td>
</tr>
<tr>
<td>Triple Constraints</td>
<td>When projects start they all ready have a very high-level scope and a “fixed” budget –</td>
<td></td>
<td>PL, BA, DV</td>
</tr>
<tr>
<td>Knowledge Transfer</td>
<td>We don’t have the existing “process” to start/step off point for the conceptual solution.</td>
<td>PL, DV, BA</td>
<td></td>
</tr>
<tr>
<td>------------------</td>
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<td></td>
</tr>
<tr>
<td>Triple Constraints</td>
<td>Parallel projects impact current projects during its life cycle</td>
<td>PL</td>
<td></td>
</tr>
<tr>
<td>rqmt's</td>
<td>We are creating the solution when we are testing. We are updating the solution after sign-off. The sign off on rqmt's is a mute point as there are changes regardless</td>
<td>TP</td>
<td></td>
</tr>
<tr>
<td>Planning</td>
<td>Partners are not brought in (or participate) to the testing/design of the solution - or are late</td>
<td>TP</td>
<td></td>
</tr>
<tr>
<td>rqmt's</td>
<td>Changed or new rqmt's are introduced late in the project – the SME's find this out in the test phase</td>
<td>PL, DV, BA, SME</td>
<td></td>
</tr>
<tr>
<td>Testing</td>
<td>All late change requests during (i.e. UAT, ORT) are “accepted”. No one says “no”</td>
<td>TP</td>
<td></td>
</tr>
<tr>
<td>rqmt's</td>
<td>When there is a change to the project solution, or changes to the rqmt' it is not communicated to all the other i.e. rooms, stakeholders.</td>
<td>PL, DV, BA</td>
<td></td>
</tr>
<tr>
<td>rqmt's</td>
<td>There is no set routine, education, training on how to create a business rqmt. There are very different levels in competency with the SME's.</td>
<td>PL, SME</td>
<td></td>
</tr>
<tr>
<td>rqmt's</td>
<td>The team lands on a solution and are signed off on rqmt's – when new resources enter the project they question and</td>
<td>SME, PL</td>
<td></td>
</tr>
<tr>
<td><strong>Triple Constraints</strong></td>
<td>Flexibility – we don’t have room anymore to be flexible and not rewarded for it (objective performance evaluation) – constrained by time, money, quality</td>
<td>PL</td>
<td></td>
</tr>
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<td></td>
</tr>
<tr>
<td><strong>Testing</strong></td>
<td>The test primes are not brought into the project early enough – don’t have time to build test cases; don’t have the time to complete documentation (that they write and get from the project team). Don’t get the deep (tacit) understanding of the project</td>
<td>TP</td>
<td></td>
</tr>
<tr>
<td><strong>rqmt’s</strong></td>
<td>Not enough time for analysis up front that result in missed rqmt’s. Don’t get a statement of the business problem. (TP, BA)</td>
<td>TP, BA</td>
<td></td>
</tr>
<tr>
<td><strong>Knowledge Transfer</strong></td>
<td>S/W (IPACT) is very complex now. Need to understand the impacts to the whole system. Solution design happens without the development teams input.</td>
<td>BA DV</td>
<td></td>
</tr>
<tr>
<td><strong>Triple Constraints</strong></td>
<td>Product comes with very loose scope and is constantly “changing their minds” causing scope creep. (SME) COVE testing is completed in parallel with the Garage project and can change the scope based on the results of the COVE results.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Triple Constraints</strong></td>
<td>Once the solution is sign-off we keep making changes</td>
<td>SME, PL</td>
<td></td>
</tr>
<tr>
<td><strong>rqmt’s</strong></td>
<td>The system should not dictate the solution. The SME’s felt that they should be the ones creating the system design rqmt’s – versus the development team</td>
<td>SME, PL</td>
<td></td>
</tr>
<tr>
<td><strong>Testing</strong></td>
<td>Don’t create enough test</td>
<td>TP</td>
<td></td>
</tr>
</tbody>
</table>
### Knowledge Transfer

<table>
<thead>
<tr>
<th>Knowledge Transfer</th>
<th>The TP is not always involved with the communicating with between the SME and the DV during testing. (TP)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge Transfer</td>
<td>Many hand off's of information - product, to technology (COVE), Project team, Business Analysis, Developers, Customer.</td>
</tr>
<tr>
<td></td>
<td>TP</td>
</tr>
<tr>
<td></td>
<td>PL</td>
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</tbody>
</table>

### External survey

<table>
<thead>
<tr>
<th>What problems, difficulties or constrains do Business Analysts have gathering system requirements?</th>
<th>What negatively impacts a project scope?</th>
<th>What inhibits the transfer of knowledge from Marketing through to Technology, the Project Team, Business Analysts, Developers, and to the Customer.</th>
<th>What inhibits the ability of S/W testers to code system requirements?</th>
<th>What inhibits the planning phase of S/W projects?</th>
<th>What is your role in the Systems Development/Project Management processes? (I.e. Project Manager, S/W Developer, etc.)</th>
<th>What industry are you:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of detail from clients</td>
<td>Missed requirements</td>
<td>Different 'lingo' used by each group</td>
<td>Improperly stated requirements</td>
<td>Time pressures</td>
<td>Overall Business Analyst - termed &quot;Solution Prime&quot;</td>
<td>Telecommunications</td>
</tr>
<tr>
<td>Improperly stated/incomplete requirements</td>
<td>Clients adding new requirements</td>
<td>Different perspectives of each group</td>
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<tr>
<td>Time pressure</td>
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<th>Time, access to knowledgeable resources, seeking clarity across conflicting requirements, and balancing the needs of the business requirements within the constraints of the technical limitations.</th>
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<th>Coding system requirements requires specific technical skill sets that many S/W testers do not have.</th>
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<td>Ensuring that they adequately capture the requirements as conveyed by the customer and that these are then captured with sufficient detail and clarity in order for a system designer or developer to take it to the next step.</td>
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<td>Lack of knowing what is needed and how it will be achieved.</td>
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<td>I am currently a full-time graduate student, though I have 20 years of experience as Program Manager, Manager of PMO, Project Manager, S/W Developer, etc.</td>
<td>I have been employed systems.</td>
<td>Project Manager</td>
<td>Safe systems IT development</td>
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<td></td>
<td>Project Manager</td>
<td>IT within academia</td>
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<tr>
<td>Addition to requirements</td>
<td>Sponsor changes scope too many times, impacts the resources being brought on at the wrong time</td>
<td>I would say too many changes in project scope during the project life cycle.</td>
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</tr>
<tr>
<td>-------------------------</td>
<td>-----------------------------------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------------</td>
<td>----</td>
</tr>
<tr>
<td>Brought into the project process too late</td>
<td></td>
<td></td>
<td></td>
</tr>
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a. Limited knowledge of the most appropriate analysis technique for the types of system requirements being gathered; e.g., trying to use only Use Cases for identifying system requirements.

b. Insufficient access/participation of key business team members.

c. Not using Facilitated Sessions to gather requirements (business team members do a better job of articulating requirements in a facilitated session than in individual interviews)

Actually, the problem is often the opposite: the transfer of knowledge from the Technology project team back to Marketing so what the customer has heard is being developed and what the customer eventually receives is consistent. As a customer, I have often had to insist on speaking to the Technology Project Team directly myself instead of only receiving answers from Marketing because the Marketing people have insufficient technical knowledge to communicate the reality of the product they are trying to market.

However, if by "Marketing" you mean "Product Development" (which is

Testers do not code system requirements. Testers test software to verify it meets system requirements. Test Cases are used to verify system requirements that are within the project scope are tested. And the Test Cases come directly from the initial system requirements.

Insufficient participation in project planning by key project team members. Too often the project is defined only by the sponsor(s) and a project manager who may not even be the project manager who will eventually execute the project once it has been approved and funded. Project charters of sufficient detail are often missing. Project schedules are often not developed at a sufficient level of detail with key project team members providing feedback before end dates and budgets become commitments.

IT Organizational Development Director, PMO Manager, Program Manager, Project Manager, Change Manager . . .
Previously Business Analyst, Programmer, DBA, Tester, Documenter, and Trainer

Presently in Higher Education Transportation, Gov
not the same thing), that is a different question.
The best way to keep Product Development people, the Technology project team, and the Customer on the same page is through frequent Customer Focus Groups, including allowing Customers to provide feedback including exercising new products very early in their development cycle; e.g., even before alpha or beta testing.

| Not being involved at the BRS session (due to PTP constraints) results in missed information that is helpful when developing System Requirements | Sponsor/Team unclear about what is in and out of scope. It is necessary that this is mailed down (at least 90%) before the BRS session. After the BRS session, the scope should be 100% | Poor system requirement definition (Unclear, misunderstood requirements) | Lack of direction by the sponsor, inability to answer questions in a knowledgeable manner. | Lead Business Analyst (a.k.a. BA of the Future/BA Evolution) | Telecommunications |
people don't know what they really want

<p>| agreed on. | scope creep..... little things get added on... or resources get pulled to work more high priority items | Contracts. Marketing says whatever they can to get the deal; doesn't matter if is actually feasible from the technical perspective... | requirements not clear or can be interpreted differently. Testers don't normally code.... | time constraints on when estimate needs to be completed. Subject matter experts (SMEs) unavailable when availability is needed | principle PM mentor and Program/Project manager as needed | Solution Provider (globally) |
| Accurately listening to the requirements given without spinning them in their own way. | Not understanding the project or requirements correctly. | Hazy details | Their inability to look outside the box from a customers POV | The 3 project constraints, Time, money, quality. | Enterprise Architect. | Telecommunications |</p>
<table>
<thead>
<tr>
<th>1) Unable to get the right stakeholders at the table.</th>
<th>1) Clear understanding of the Business Opportunity or problem, scope, objectives (with metrics).</th>
<th>SW testers that code requirements ?? Coders or developers design and code system requirements.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2) Lack of commitment - dedication of key stakeholders</td>
<td>2) Lack of traceability between requirements artifacts.</td>
<td>Now if you mean what inhibits SW testers to test system requirements ... then</td>
</tr>
<tr>
<td>3) Stakeholders are geographical dispersed and difficult to get together as a team (budget, time)</td>
<td>3) Language - Business language versus, system language, marketing language, technical language,</td>
<td>1) Lack of time. PMs and project sponsors wish to have projects completed ASAP and pressure teams. Often this inhibits proper requirement Management &amp; planning.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Opportunities or problem area not well defined or ambiguous.</th>
<th>1) Unclear requirements</th>
<th>2) Lack of context to requirements - no Use Case (ability to write test scenarios for Normal, alternate and exception scenarios (instances).)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2) Project scope is too large and vague.</td>
<td>2) Lack of non functional requirements - affects ability to test e.g. Performance (response time, load test, stress test), security requirements etc.</td>
<td></td>
</tr>
<tr>
<td>3) Realistic objectives are not set.</td>
<td></td>
<td>1) Lack of metrics;metrics to properly estimate (time, cost, quality).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2) Lack of the right, skill and available resources.</td>
</tr>
</tbody>
</table>

<p>| Senior Business Analysis | Telecommunications Validation |</p>
<table>
<thead>
<tr>
<th>Stakeholders with unclear objectives</th>
<th>Requirements that are not “SMART” (specific, measurable, achievable, relevant, traceable)</th>
<th>Loss in communication flow and different agendas.</th>
<th>Interpretation of the business requirements</th>
<th>The unknowns</th>
<th>Project Manager</th>
<th>Telecommunication</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>insecurity amongst team members, general mistrust in the organisation, lack of support from the management, lack of allocation of time to do the sufficient knowledge transfer, insufficient documentation, high turn-around of knowledge workers</td>
<td>Project manager does not know the need for the project, management wants the solution turned around in shorter time than the project really requires, the project changes hands from 1 manager to another, management not willing to allocate the requisite resources for the planning, the project manager not conversant with planning tools or all aspects of the project</td>
<td>Business analyst</td>
<td>Information Technology</td>
<td>Why would the testing team code?</td>
<td></td>
</tr>
<tr>
<td>Reorganizations of company - my project was started in 2005, the company has gone thru a reorg resulting in loss of original project team members. Some were let go from the company, some got new assignment s and were pulled off the project. The project oversight was changed as well (sponsor) who felt more scope could be added.</td>
<td>not having dedicated BA's to effectively document and communicate the marketing requirements. There is a need for a specialized team that can work with the business areas enough to understand their world then be able to translate that into requirements.</td>
<td>Business will submit the project 'need' but also try to drive the IT solution.</td>
<td></td>
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</tr>
<tr>
<td>Knowing what they really need resources available unsure about what are their long/short term objectives</td>
<td>Scope creep no restraints on changes lack of change of order lack of change of scope procedures</td>
<td>Lack of effective communication inability to speak in terms that others will be able to understand lack of vision through the eyes of others</td>
<td></td>
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</tr>
<tr>
<td>Project Manager Banking/Government</td>
<td>Project Manager Banking/Government</td>
<td>Project Manager - IT Insurance</td>
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</tr>
<tr>
<td>Not well thought out or communicated business requirements that are required for system requirements</td>
<td>Executive buy in</td>
<td>Project team by in Resource availability</td>
<td>Clear, concise and appropriate communication</td>
<td>Change controls Poor Release Configuration Management</td>
<td>Time to market constraints People do not take the time to properly plan</td>
<td>Project Manager Telecommunications</td>
</tr>
<tr>
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<td>---------------------------------------------</td>
<td>-----------------------------------------------</td>
<td>-----------------------------------------------</td>
<td>----------------------------------</td>
</tr>
<tr>
<td>Time to market constraints</td>
<td>Lack of understanding of the project</td>
<td>How the information is transfered - the media</td>
<td>Time to market constraints People do not take the time to properly plan</td>
<td>Change controls Poor Release Configuration Management</td>
<td>Time to market constraints People do not take the time to properly plan</td>
<td>Project Manager Packaging Machinery</td>
</tr>
</tbody>
</table>

**Appendix I Survey 1.2**

**Survey (1.2)**

**IMPORTANT:** in an attempt to eliminate bias to this survey it is significant that you do not review this document prior to the focus session dated Feb 23, 2006.

Thank you for participating in this focus group. If you would like to read the final journal contact me via email ([david.mckenna@bell.ca](mailto:david.mckenna@bell.ca)) and I will forward the document upon completion.
Below are a number of questions regarding the success or failure of the training programs, knowledge transfer and “stickiness” of that knowledge with the environment of the IP Factory.

This survey is constructed in the manner that you answer a question on a scale of 1 to 5 (1 being “Strongly disagree” and 5 being “Strongly agree”). Upon responding you are given space to add your direct comments with respect to the question. Please take a moment as add your thoughts.

When responding to the question, circle the number that best represents your answer.

1 being: Strongly disagree
2 being: Disagree
3 being: neutral (neither agree nor disagree)
4 being: Somewhat agree
5 being: Strongly agree

Upon completion of the survey please mail (or e-mail) your responses to:

David McKenna
100 Dundas St., N Flt 3
London, Ontario
N6A 4L6

Again, thank you for your participation.

(1) On the scale of 1 to 5 rate the quality of training you have received within the IP Factory.

1  2  3  4  5

What could have been done to improve the training:

________________________________________________________________________
(2) Did you find that you were able to retain the new knowledge that you received.

1  2  3  4  5

What could have been done to improve the training:

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

(3) How important is it to be a Community of Practice (COP) being networked together as a team to within the same office?

1  2  3  4  5

Comments:
________________________________________________________________________
________________________________________________________________________
(4) How important is it to be a Community of Practice (COP) being networked together as a team to virtual?

1  2  3  4  5

Comments:

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

(5) Did you feel you had the opportunity to integrate your ideas into the training session?

1  2  3  4  5

Comments:

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
(6) Did you get enough hands-on, or cases studies to augment the training?

1  2  3  4  5

Comments:
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

(7) Do you feel that there should be a mechanism to “test” knowledge retention? I.e. a quiz following training?

1  2  3  4  5

Comments:
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

Question

1  On the scale of 1 to 5 rate the quality of training you have received within the IP Factory.
2 Did you find that you were able to retain the new knowledge that you received.

<table>
<thead>
<tr>
<th>rating</th>
<th>response</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly disagree</td>
<td>1</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>29%</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>29%</td>
</tr>
<tr>
<td>Strongly agree</td>
<td>5</td>
<td>43%</td>
</tr>
</tbody>
</table>

3 How important is it to be a Community of Practice (COP) being networked together as a team to your office?

<table>
<thead>
<tr>
<th>rating</th>
<th>response</th>
<th>%</th>
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</thead>
<tbody>
<tr>
<td>Strongly disagree</td>
<td>1</td>
<td>14%</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>14%</td>
</tr>
<tr>
<td>Strongly agree</td>
<td>5</td>
<td>71%</td>
</tr>
</tbody>
</table>

4 How important is it to be a Community of Practice (COP) being networked together as a team to your office?

<table>
<thead>
<tr>
<th>rating</th>
<th>response</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>3</td>
<td>43%</td>
</tr>
<tr>
<td>5</td>
<td>4</td>
<td>57%</td>
</tr>
</tbody>
</table>

5 Did you feel you had the opportunity to integrate your ideas into the training session?

<table>
<thead>
<tr>
<th>rating</th>
<th>response</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td>29%</td>
</tr>
</tbody>
</table>
6  Did you get enough hands-on, or cases studies to augment the training?

<table>
<thead>
<tr>
<th>rating</th>
<th>response</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>0%</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>0%</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>57%</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>29%</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>29%</td>
</tr>
</tbody>
</table>

7  Do you feel that there should be a mechanism to “test” knowledge retention?

<table>
<thead>
<tr>
<th>rating</th>
<th>response</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>29%</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>14%</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>0%</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>43%</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>14%</td>
</tr>
</tbody>
</table>

Appendix J  Business Analysis Search Results
<table>
<thead>
<tr>
<th>BA</th>
<th>Bronze Age</th>
</tr>
</thead>
<tbody>
<tr>
<td>BA</td>
<td>Bowling Alley</td>
</tr>
<tr>
<td>BA</td>
<td>Billing Address</td>
</tr>
<tr>
<td>BA</td>
<td>Bad Apples (Guns N' Roses song)</td>
</tr>
<tr>
<td>BA</td>
<td>Business Agent (labor unions)</td>
</tr>
<tr>
<td>BA</td>
<td>Bell Atlantic (telephone company; now Verizon)</td>
</tr>
<tr>
<td>BA</td>
<td>Business Aviation (charter flights)</td>
</tr>
<tr>
<td>BA</td>
<td>British Aerospace</td>
</tr>
<tr>
<td>BA</td>
<td>Bosnia Herzegovina (ISO country code)</td>
</tr>
<tr>
<td>BA</td>
<td>Bundesanstalt für Arbeit (German: federal job office)</td>
</tr>
<tr>
<td>BA</td>
<td>Breathing Apparatus</td>
</tr>
<tr>
<td>BA</td>
<td>Black Arrow</td>
</tr>
<tr>
<td>BA</td>
<td>Bombardier Aerospace (aircraft manufacturer)</td>
</tr>
<tr>
<td>BA</td>
<td>Bombs Away</td>
</tr>
<tr>
<td>BA</td>
<td>Biological Assessment</td>
</tr>
<tr>
<td>BA</td>
<td>Building Automation</td>
</tr>
<tr>
<td>BA</td>
<td>Bad Attitude</td>
</tr>
<tr>
<td>BA</td>
<td>Bibliotheca Alexandrina (Alexandria, Egypt)</td>
</tr>
<tr>
<td>BA</td>
<td>Budget Authority</td>
</tr>
<tr>
<td>BA</td>
<td>Bronchial Asthma</td>
</tr>
<tr>
<td>BA</td>
<td>Biosecurity Australia (created October 2000)</td>
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<tr>
<td>BA</td>
<td>Booksellers Association</td>
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<td>BA</td>
<td>Basal Area</td>
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<tr>
<td>BA</td>
<td>Biological Abstracts</td>
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<tr>
<td>BA</td>
<td>Balloon Angioplasty</td>
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<tr>
<td>BA</td>
<td>Brachial Artery</td>
</tr>
<tr>
<td>BA</td>
<td>Bnei Akiva (Jewish Zionistic youth group worldwide)</td>
</tr>
<tr>
<td>BA</td>
<td>Bari, Puglia (Italian province)</td>
</tr>
<tr>
<td>BA</td>
<td>Binding Acknowledgement</td>
</tr>
<tr>
<td>BA</td>
<td>Broker Associate (real estate)</td>
</tr>
<tr>
<td>Abbreviation</td>
<td>Description</td>
</tr>
<tr>
<td>--------------</td>
<td>-------------</td>
</tr>
<tr>
<td>BA</td>
<td>Be-Arsed</td>
</tr>
<tr>
<td>BA</td>
<td>Bus Adapter</td>
</tr>
<tr>
<td>BA</td>
<td>Bruce Almighty (movie)</td>
</tr>
<tr>
<td>BA</td>
<td>Budget Analysis</td>
</tr>
<tr>
<td>BA</td>
<td>Beerenauslese (German wine)</td>
</tr>
<tr>
<td>BA</td>
<td>Blocks Against (basketball scoring)</td>
</tr>
<tr>
<td>BA</td>
<td>Brutal Attack (band)</td>
</tr>
<tr>
<td>BA</td>
<td>Breathing Air</td>
</tr>
<tr>
<td>BA</td>
<td>Budget Activity</td>
</tr>
<tr>
<td>BA</td>
<td>Basic Access</td>
</tr>
<tr>
<td>BA</td>
<td>Behaviour Analysis (psychiatry/psychology)</td>
</tr>
<tr>
<td>BA</td>
<td>Blood Agar</td>
</tr>
<tr>
<td>BA</td>
<td>Barrel Aged (beer)</td>
</tr>
<tr>
<td>BA</td>
<td>Basic Agreement</td>
</tr>
<tr>
<td>BA</td>
<td>Bass Amplifier</td>
</tr>
<tr>
<td>BA</td>
<td>Bowling Association</td>
</tr>
<tr>
<td>BA</td>
<td>Benefits Administrator</td>
</tr>
<tr>
<td>BA</td>
<td>Brewing Aerospace</td>
</tr>
<tr>
<td>BA</td>
<td>Brewers Association (Boulder, Colorado)</td>
</tr>
<tr>
<td>BA</td>
<td>Battle Area</td>
</tr>
<tr>
<td>BA</td>
<td>Biblical Archaeologist</td>
</tr>
<tr>
<td>BA</td>
<td>Bankers' Acceptance (finance)</td>
</tr>
<tr>
<td>BA</td>
<td>Brandy Alexander (cocktail)</td>
</tr>
<tr>
<td>BA</td>
<td>Bonne Action (French: good deed)</td>
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<tr>
<td>BA</td>
<td>Basic Allowance</td>
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<tr>
<td>BA</td>
<td>Battlespace</td>
</tr>
<tr>
<td>BA</td>
<td>Awareness</td>
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<tr>
<td>BA</td>
<td>Basic Assembly</td>
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<tr>
<td>BA</td>
<td>Bearing Area</td>
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<tr>
<td>BA</td>
<td>Buffer Amplifier</td>
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<tr>
<td>BA</td>
<td>Bare-Assed</td>
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<tr>
<td>Level</td>
<td>Acronym</td>
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<td>-------</td>
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</tr>
<tr>
<td>BA</td>
<td>Boston Acoustics, Inc. (speaker maker)</td>
</tr>
<tr>
<td>BA</td>
<td>** BA</td>
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<tr>
<td>BA</td>
<td>Ballistic Aggregation</td>
</tr>
</tbody>
</table>
Acronym Finder

http://www.acronymfinder.com/

Appendix K  Example agenda:

1. ** PROJECT NAME  
   ** Project Central  – Requirements gathering phase

2. ** PURPOSE, OBJECTIVES AND ELEMENTS OF MEETING:**

The purpose of the Project Central project is to upgrade the existing time reporting application with new features to enhance the user functionally and the back-end financial accounting reporting.

The objective is to decrease the time required for the end user inputting their weekly time and associated activities by 25%. Back-end enhancement will include enhanced reporting.
This meeting, dated May 20, 2009, will be the first of two scheduled user requirements sessions to define and document the end user’s business requirements. This session will be conducted using an interview format.

3. MEETING LOGISTICS

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Location</th>
<th>Dial-in</th>
<th>NetMeeting Host</th>
</tr>
</thead>
<tbody>
<tr>
<td>May 20, 2009</td>
<td>1:00 – 3:00 pm</td>
<td>100 Main St, Flr 3, Tahoe Room</td>
<td>N/A</td>
<td>N/A</td>
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</table>

4. ATTENDEES

<table>
<thead>
<tr>
<th>Attendee</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>David McKenna</td>
<td>Business Analyst (BA)</td>
</tr>
<tr>
<td>Eric Smith</td>
<td>Interviewee</td>
</tr>
<tr>
<td>Susan Younger</td>
<td>Interviewee</td>
</tr>
</tbody>
</table>

- 345 -
5. AGENDA

<table>
<thead>
<tr>
<th>ITEM</th>
<th>TIME</th>
<th>TOPIC</th>
<th>PRIME</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1:00 – 1:05</td>
<td>Introductions</td>
<td>DGM</td>
</tr>
<tr>
<td>2</td>
<td>1:05 – 1:10</td>
<td>Review Agenda/Rules of Engagement</td>
<td>DGM</td>
</tr>
<tr>
<td>3</td>
<td>1:10 – 1:50</td>
<td>Scenario based questions and answer interview</td>
<td>ALL</td>
</tr>
<tr>
<td>4</td>
<td>1:50 – 2:00</td>
<td>Break</td>
<td>ALL</td>
</tr>
<tr>
<td>5</td>
<td>2:00 – 2:40</td>
<td>Continue scenario based questions and answer interview</td>
<td>ALL</td>
</tr>
<tr>
<td>6</td>
<td>2:40 – 2:50</td>
<td>Next steps</td>
<td>DGM</td>
</tr>
</tbody>
</table>

6. LIST OF ATTACHMENTS

Appendix L Ambiguous Terms

<table>
<thead>
<tr>
<th>Ambiguous Terms</th>
<th>Ways to Improve</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acceptable</td>
<td>Describe and characterize what is acceptable. “The system will close in 20 seconds…..”</td>
</tr>
<tr>
<td>Adequate</td>
<td></td>
</tr>
<tr>
<td>At least</td>
<td>Detail the minimum and maximum limits. “The mean</td>
</tr>
<tr>
<td>At minimum</td>
<td>time to repair is between the maximum of four hours and a minimum of two hours.</td>
</tr>
<tr>
<td>No more than</td>
<td></td>
</tr>
<tr>
<td>Not to exceed</td>
<td></td>
</tr>
<tr>
<td>Depends on</td>
<td>Describe in detail what the dependency is and how they are interrelated. “System ABC will be pulling from fields one and two the customer name and customer address from system XYZ…”</td>
</tr>
<tr>
<td>Efficient</td>
<td>In detail describe the limits quantifiably surrounding efficiencies. “The system ABC will pull data from system XYZ every 15 minutes…..”</td>
</tr>
<tr>
<td>Fast</td>
<td></td>
</tr>
<tr>
<td>Rapid</td>
<td></td>
</tr>
<tr>
<td>Quick</td>
<td></td>
</tr>
<tr>
<td>Flexible</td>
<td>Illustrate how the system will change in response to a change in a business need. “If the user inputs data into field 24 that is more than 75 characters the system will…”</td>
</tr>
<tr>
<td>Variable</td>
<td>Distinguish between the limits of variability. The upper limit is 47 and the lower limit is 12…”</td>
</tr>
<tr>
<td>Optimize</td>
<td></td>
</tr>
<tr>
<td>Normal</td>
<td>Describe the situation or the system in abnormal circumstances. “Once the system reaches the limit of 450 users no other user can access the system until…..”</td>
</tr>
<tr>
<td>Ideally</td>
<td></td>
</tr>
<tr>
<td>Average</td>
<td></td>
</tr>
<tr>
<td>Optionally</td>
<td>Describe how a rule is applied optionally. “The system will return an alert box indicating to the user that they must input into field 45 or 62 the requested data…”</td>
</tr>
<tr>
<td>Voluntary</td>
<td></td>
</tr>
<tr>
<td>Possible</td>
<td></td>
</tr>
<tr>
<td>When necessary</td>
<td>A clear explanation of the judgment is needed. “The process asks the user if the risk is higher than 60% they are to complete the risk response management plan…”</td>
</tr>
<tr>
<td>Where appropriate</td>
<td></td>
</tr>
<tr>
<td>Robust</td>
<td>Define the systems performs under both normal and unusual conditions. “The system will operate for six months without rebooting…”</td>
</tr>
<tr>
<td>Seamless Transparent</td>
<td>User expectation of a system need to be expressed into observable product characteristics. “System ABC will have application programming interfaces (API) with system XYZ and will update system ABC…”</td>
</tr>
<tr>
<td>Shouldn’t</td>
<td>State all requirements that the system can do in the positive. “The system will give the user access once they input their user name and identification credentials…”</td>
</tr>
<tr>
<td>Sufficient Enough Satisfactory</td>
<td>Quantify what is needed. “The system will accept 450 users at the simultaneously…”</td>
</tr>
<tr>
<td>Enable Support Maintain</td>
<td>Define what the process of system will actually perform. “The system has 6 access levels…”</td>
</tr>
<tr>
<td>Simple Easy User-friendly</td>
<td>Illustrate in detail the system characteristics and usability. “The system will promote the user, using a “pop-up” text box, to input their name once in the system…”</td>
</tr>
<tr>
<td>State-of-the-art</td>
<td>Give a definition for the meaning and quality of state-of-the-art. “The system runs at capacities ranging from 3-5Mbps to as high as 1Gbps on connections which are monitored 24/7…”</td>
</tr>
<tr>
<td>Numerous Several Various</td>
<td>Give actual amounts. “There are six steps to…”</td>
</tr>
<tr>
<td>Hold</td>
<td>Define what action is within the system. “The system will not move to section two until all of the fields on page 74 are populated with data…”</td>
</tr>
<tr>
<td>Smooth</td>
<td>Describe how the system will operate. “The system will initiate the firewall script upon the user logging into ABC…”</td>
</tr>
<tr>
<td>Till</td>
<td>Be specific regarding the limitations of time within the system. “Users that have not linked their account to application ABC by June 1, 2010 will be denied access to the system…”</td>
</tr>
<tr>
<td>------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Until</td>
<td></td>
</tr>
<tr>
<td>Allow</td>
<td>Define what the system will do. “The end users can add text and pictures within the application…”</td>
</tr>
<tr>
<td>Transfer</td>
<td>Describe how the system will operate. The ABC system will pull data from system XYZ every 30 minutes…”</td>
</tr>
<tr>
<td>They</td>
<td>Be specific regarding the actors you are referring. “The business analysis completes step two and the architecture designer completes step three…”</td>
</tr>
<tr>
<td>Them</td>
<td></td>
</tr>
</tbody>
</table>

**Appendix M Results of expert panel - April 21, 2010:**
Expert Panel Review 07-Apr-10

Name (Optional) Your Skills & Experience, years in the project management field

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
</table>

1 - strongly agree, 2 - disagree, 3 - neither agree nor disagree, 4 - agree, 5 - strongly agree

Would you recommend this model to a project management, change management organization?

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
</table>

Why do you think the model would be effective in the workplace?

|  |  |  |  |  |
|---|---|---|---|

Why do you think this model would not be effective in the workplace?

|  |  |  |  |  |
|---|---|---|---|

Results of expert panel - April 21, 2010

Collective years of experience in project management: 227
PMP certified: 3

Number of attendees: 21 (4 left on the hour to attend other commitments)
Number of Respondents: 17

Results of Likert Scale: 76.5% agree to "would you recommend this model to a project management, change management organization."
Would you recommend this model to a project management, change management organization?

1 - strongly agree, 2 - disagree, 3 - neither agree nor disagree, 4 - agree, 5 - strongly agree

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.00%</td>
</tr>
<tr>
<td>2</td>
<td>5.88%</td>
</tr>
<tr>
<td>3</td>
<td>17.65%</td>
</tr>
<tr>
<td>4</td>
<td>76.47%</td>
</tr>
<tr>
<td>5</td>
<td>0.00%</td>
</tr>
</tbody>
</table>

Comments

Why do you think the model would be effective in the workplace?

I think it would more openly acknowledge and recognize the barriers to knowledge transfer. This may provide an opportunity to change and or alter the impending course of distraction and multitasking that we are currently on.

This model would be effective in the workplace as it allows for time management instead of time slicing which allows individuals the opportunity to put their best effort forward and complete tasks properly.

Demonstrated thru factual data that the model can work by raising awareness of distracters that we invite in or assume "have to be" part of our working environment.

It's a good overview of some interesting methods - voice of the customer or user needs analysis combined with high performing teams. The concepts made sense and can be applied somewhat easily.

Good guidelines of things to keep in mind

Like it overall

common sense - it makes sense in theory

It would help protect project managers improve overall quality and satisfaction of project teams. Likely improve the likelihood of success of projects.

Provides clear best practices - logical, easy to follow, clear benefits.

Very interesting ideas, worth further discussion. Thanks for sharing you thesis. Hope it takes off. Would be very interested in reading your thesis and research.

Excellent supporting examples.

The knowledge (common sense) categorizes in "do's and don'ts"
A model for organizational willing to invest in knowledge transfer, as it will equip them with a process to do so. Work with PMI and make this integrate to their change management process.

yes, it seams true
yes - because it addresses all the challenges that we are currently facing.
yes - certain components

Why do you think this model would not be effective in the workplace?

Due to aggressive company timeline demands and a diminishing workforce, individuals are forced to 'multitask' in order to cover all expectations and objectives

Works somewhat against human nature and may be disregarded because I think many people are disinterested in actually receiving knowledge

At XYZ company * we move very fast and often times don’t see value in producing documentation. I was fortunate to work under Bob Smith ** for two plus years and learned how to perform technical review which is a key method strategy to write requirements clearly. Bob is no longer with XYZ company but I think XYZ company was not ready for such "Discipline".

May be captured in another bucket - but could also consider that you are transferring knowledge to the right audience - we zone out in meetings and multitask because we don’t really need to be there.

How does technology fit in?

Makes sense in theory - reality?
Mobile application and technology are leading us into a future of promoting multi tasking idea.
feasibility under timelines
Hard to implement given demands on people within workplace.

Most of what was presented deals with on in-person push of information. What about a more passive scenario where the learner comes to say a website and consumes the information there. Are there best practices when it comes to designing a knowledge base for requirements and project documentation.

Need more time to absorb the information behind the model

What needs to make this more robust is focus on the "to do's" not the "not to do's". It comes across as an observation rather than an enabler. We still have the challenge to know "how" to transfer knowledge and how project can succeed. The research is worthwhile to share, as well as the conclusions.

Not really a model or took that can be easily applied into daily work.
helpful but no clear or straightforward ways to using in ore easy as 1. 2. 3.

I don’t dispute the logic, I just don’t think it can be applied in the near term without reversing technological change.

Lack of endorsement
<table>
<thead>
<tr>
<th>We are moving more to distractions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Destructive distractions will be challenging to get away from</td>
</tr>
<tr>
<td>It is difficult to move away from distraction as many companies make them (smartphones)</td>
</tr>
<tr>
<td>Does not address some of the practical realities of an environment like ABC company *** that have teams in multiple locations, not enough meeting rooms, conference calls are a necessity - moving to social computing model of communicates i.e. blogs, wikis - some of these tools will overcome challenges - database information and people - where knowledge, skills, expertise keywords and tagged. Information you receive is based on your role in the organization.</td>
</tr>
<tr>
<td>Challenge to enabling is gap in human behaviour, arrogances and the need to push back is common and even though data suggests otherwise this model would be difficult to gain 100% support.</td>
</tr>
</tbody>
</table>

* XYZ company is a fictional name
** Bob Smith is a fictional name
*** ABC company is a fictional name

<-- Web site is addressed in thesis