Information Management and Sharing Practices within a Construction Project Process

A thesis submitted in fulfilment of the requirements for the degree
Doctor of Philosophy

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February 2014
Declaration

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

Huan Cong Vo-Tran

February 2014
Acknowledgements

I would like to thank and express my sincere appreciation to those who have contributed to this PhD and supported me during this amazing journey. I am forever indebted to them for their unfailing support and goodwill. There are so many people that I need to show my appreciation to and I fear that I have failed to mention some who should have been named. Where that is the case, I sincerely ask them to forgive me.

First and foremost, I would like to express my deepest appreciation to my senior supervisor Associate Professor Peter Macauley. Without his mentoring, invaluable comments, constructive criticism, friendship and encouragement I would not be where I am today. For this I am eternally grateful.

Much thanks and gratitude should also be directed towards my associate supervisor, Professor Brian Corbitt. Professor Corbitt has been a tremendous mentor from whom I have been able to benefit greatly with his passion for research and incredible wealth of knowledge. His ability to inspire and motivate me throughout this journey has made this such an enjoyable experience – one that I will cherish forever.

It has been a great privilege, and a humbling experience for me to be supervised and taught by two such remarkable scholars. Words cannot fully express how thankful I am for having them be a part of my PhD journey.

Special thanks must also be attributed to Dr Sittimont Kanjanabootra, for his continuous support and insight into the construction industry. Without his expert advice, I would have not been able to fully comprehend the nuances that occur within the construction industry.

Thanks and acknowledgements should also be given to the staff within the Information Management team at RMIT University (Dr Paul Mercieca, Dr Susan Reynolds, Ms Bernadette Welch and Mr John Terrell). They have been able to provide me with ongoing support by allowing me to bounce my ideas around and providing me with useful feedback.

I also wish to record my gratitude to the participants involved in this study. Although it is not appropriate to name them here, their contributions in terms of giving up their
valuable time and effort in order to share their experiences and insights with me has been invaluable. Without their help, this thesis would literally have not been possible.

A heartfelt thanks goes out to my mother Cuc Tran. A loving, caring and selfless individual who, in the early 1980s, bravely endured a gruelling seven days and seven nights in pirate infested seas as a Vietnamese boat person in order to provide a better life for both myself and my siblings (Han, Hao and Hung). I thank her for the many values she has instilled within me, one of which was teaching me the importance of receiving an education. To this day, I find myself constantly reciting the Vietnamese phrase she had taught me many years earlier: ‘Sự học là chìa khóa mở tất cả kho tàng’ which translates to ‘Education is the key that opens all doors’.

I owe my deepest gratitude to my wonderful wife, Hoang, for eternal support and understanding of my goals and aspirations. Her infallible love and support has always been my strength. Her patience and sacrifice will remain my inspiration throughout my life. Without her help, I would not have been able to complete much of what I have done and become who I am.
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List of Abbreviations

ACONEX = A Concatenation of Australian Construction Exchange
BBC = British Broadcasting Corporation
BCHEAN = Business College Human Ethics Network
EIM = Enterprise Information Management
GBCA = Green Building Council of Australia
GFA = Gross Floor Area
IA = Information Audit
IBM = International Business Machines
IDMS = Inspection and Defects Management System
PIM = Personal Information Management
PLS = Plain Language Statement
SECI = Socialisation, Externalisation, Combination, Internalisation
Abstract

Information can be seen as one of the most important assets that an organisation can possess. Utilised correctly, information can allow an organisation irrespective of its industry or domain, to communicate, operate, plan, and make decisions that would ultimately be beneficial to itself, its clients and any other entities that interact with it. Although there are many different types of systems, policies and procedures an organisation could implement to manage and share their information, these are not always used consistently and it ultimately comes down to an individual’s experiences and preferences in handling the information.

Through the lens of an information audit, the following study investigated the information management and sharing practices between a team of stakeholders as they cycled through the defects inspection process for a complex, purpose-built, multi-million dollar educational building for a prominent Australian university. It explored how the stakeholders’ experience, personal and enterprise information management practices, tacit and explicit knowledge played a role in the management and sharing of information.

Data was collected over an intensive fourteen-week period whereby the researcher made use of a combination of techniques, which included: document analysis, on-site observations and one-on-one interviews. Academic rigour was maintained through the triangulation of the data collection process where experienced researchers who possessed specific domain knowledge in information management and construction were invited to participate in order to validate the primary researcher’s observations.

The results from the study revealed several key findings. The first alluded to the fact that although enterprise information management practices were in place to deal with the volume and complexity of the information presented, these practices were often supplemented by the personal information management practices adopted by the stakeholders. The second indicated that stakeholders who possessed greater amounts of experience tended to rely upon the use of their tacit knowledge to manage and share information. Whereas stakeholders who possessed lesser amounts of experience had a tendency towards the use of explicit forms of documentation. Finally, from the perspective of information management practices within the construction industry, the findings suggested that stakeholders perceived information management under the
premise of construction management as this was their primary area of domain-specific knowledge. Having a greater understanding of these factors could facilitate a decrease in the number of defects and re-work that often occur in every construction project. If the amount of re-work in construction projects can be reduced or eliminated, then the construction process effectiveness could be improved.
Publications from Thesis


1 Introduction

This thesis is a study of the information management and sharing practices of a team of stakeholders involved in a complex construction project as they complete the defects inspection process for a purpose-built, innovative, multi-million dollar, academic building for a prominent Australian University. The defects inspection process could be seen as a vital process towards the end of a construction project with a primary role to identify and rectify any items that will directly affect the performance of a structure. Through the use of an information audit, the study will report upon and map the information flows within the defects inspection process and the key factors that play a role in the way the stakeholders manage and share information. As a result of conducting this study, the findings were able to provide a richness to the understanding of the information management and sharing practices of the stakeholders involved in a complex construction project.

1.1 Definitions Relevant to this Study

The following table will provide a set of definitions that are relevant to the context of this study.

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACONEX</td>
<td>A knowledge management software application developed to assist with construction and engineering projects.</td>
</tr>
<tr>
<td>Defect</td>
<td>The term defect refers to an object that has not been built to its intended specifications, and is therefore deemed to be defective.</td>
</tr>
<tr>
<td>Defecting</td>
<td>The process in which stakeholders examine a building for items that have not been built to its intended specifications.</td>
</tr>
<tr>
<td>IDMS</td>
<td>A software application developed by QA Software to record defects and other inspection results.</td>
</tr>
</tbody>
</table>

Table 1-1: Definitions relevant to this study
1.2 The Project Case Study

In April 2008, a prominent Australian University began its initial steps towards the construction of a purpose-built, innovative, multi-million dollar academic building that would eventually house an entire faculty including its students and staff. Just a little over four years later, and 108 days ahead of schedule, the building had reached the practical completion stage (handover of keys to the client). During this time, numerous stakeholders were involved in the processes and sub-processes that were required to complete this complex construction project.

Throughout the scoping, feasibility and design stage of the building, user groups were extensively consulted and by the time the documentation phase was complete and the project was sent out for tender in August 2010, the scope of the construction project had included:

- 12 specialised teaching spaces ranging from a capacity of 90 to 360 people, complete with under floor displacement mechanical systems (see Figure 1-1);
- 64 specialised teaching spaces with a capacity from 30 to 60 people (see Figure 1-2);
- Open plan office space over seven floors to house 850 staff (see Figure 1.3);
- A Green Building Council of Australia (GBCA) 5-star Green Star rated education facility that signifies “Australian Excellence” in environmentally sustainable design;
- Centre atrium complete with escalators between levels 2 and 7 and interconnecting stairs between levels 7 and 11 (see Figure 1-4);
- 11 double height student portal spaces designed to recreate the “university lawn” experience, complete with mixed mode ventilation to reduce energy consumption (see Figure 1-5);
- Innovative aluminium façade complete with sunshades to maximise shading and reduce solar heat gain (see Figure 1-6) and;
- An AUD 6 million state of the art IP-addressable AV system.
Figure 1-1: Example of a specialised teaching space that accommodates 90 to 360 people

![Image](image1)

Figure 1-2: Example of a specialised teaching space that accommodates 30 to 60 people

![Image](image2)
Chapter One: Introduction

Figure 1-3: Example of an open plan office space

Figure 1-4: Inter-connecting stairs between levels 7 and 11
However, by the time the contracts were signed and construction commenced, the project scope was revised to include six large lecture theatres, 70 small and medium sized teaching and learning spaces, nine student portals and recreation spaces, eleven retail spaces and a mixture of office and open space workstations that is able
to accommodate 300-plus academics, 200 administrative staff and 300 PhD students.

Although from the initial conception to the practical completion of the building took a little over four years, this particular research project focused upon the defects inspection process, which was conducted over an intensive 14 week period towards the end of the construction project. The defects inspection process was chosen as the case study as a large amount of defect-related information was both generated and managed during this intensive 14 week period. In total, there were over 15,000 defects spanning twelve storeys (including basement and multi-purpose rooftop space) and covering a Gross Floor Area (GFA) of 35,000 square metres identified and rectified within the 14 weeks prior to the handover of the building. To add to the complexity and enormity of the task, various stakeholders with varying domain knowledge and experience were involved in completing this critical stage. These included project managers, engineers, tradespeople, architects, suppliers and the builders themselves.

1.3 The Importance of Information and its Management

Information can be seen as an integral part of any organisation and one of the most valuable assets that it may possess (Burk & Horton 1988; Best 1996). Irrespective of an organisation’s industry or domain, information has the ability to facilitate operations, communication, planning, and decision-making that would ultimately be beneficial to itself, clients and any other entities that may interact with them (Porter 1985, 1997; Porter & Millar 1985; Kaye 1995; Choo 1996, 1998; Buchanan & Gibb 1998; Kirk 1999; Sohal & Fitzpatrick 2002; Veloutsou et al. 2004; Jenkinson 2006; Iaryczower & Shum 2012; Kousky & Cooke 2012).

As organisations begin to create, accumulate, store and disseminate information, they tend to lose sight of how to manage it, and what information they and their employees actually possess (Davenport & Pruzak 2000). Edmunds and Morris (2000, p. 20) suggests that ‘during the last century, developments in communication systems [have] led directly to an increase in the amount of information in the workplace’. Organisations such as architectural practices and construction companies are not only dealing with traditional paper-based documents, but are
now also dealing with an abundance of unstructured data such as emails, pictures from building sites, technical drawings, formal documents from governing organisations, handwritten notes taken during interviews with clients and even transcripts collected from focus group activities (Lewis 1996; Blumberg & Atre 2003).

In order for organisations across all industries to achieve high performance it is stated that ‘effective information management is the key’ (Rogalski 2006, p. 36), but the sheer amount of unstructured data being created by any organisation present them with many challenges. Rogalski continues by stating that ‘finding the right information is difficult, [and that] information is not well leveraged among partners and it is not coming together in ways that will yield useful new insights’ (Rogalski 2006, p. 36).

Stories of poor information management and sharing practices occur regularly in the media, which damage the credibility of organisations and turn potential clients away. In a recent presentation by Australia’s Information Commissioner, McMillan (2012) highlighted several different cases of poor information management practices. Examples include:

- The resignation of the Director-General of the BBC, George Entwhistle. After 54 days in the job, Entwhistle resigned after admitting that he had failed to check the evidence before allowing a BBC program to be televised. In the televised program, Lord McAlpine, a senior conservative member of parliament was wrongly named as a sexual predator;
- The investigation into a Telstra mail-out that sent out 220,000 letters with personal information to the wrong addresses;
- The inadvertent collection of Google Street View cameras of unsecured Wi-Fi data from personal wireless networks;
- Vodafone’s failures to implement effective password security measures to protect the personal information it held on 4 million customers; and
- A cyber-attack on the Sony PlayStation network that exposed the personal files of 77 million customers.
Such cases of poor information management and sharing practices which have led to serious project delays or failures have also been reported within the construction industry; for example, the recent redesign and redevelopment of Wembley Stadium in the UK which faced considerable delays throughout its construction process. The case had received much media attention with various news sources (Rowson 2009; Griffiths 2009; Moore 2011) as it was reported that the Australian construction company at the centre of it all lodged a £253M claim against the designer. The claim was lodged on the basis that the construction company was not provided with enough access to design information in order for them to price their bid for the stadium accurately. In addition, it was also reported that the information flows around the project were not eagerly shared as the junior employees of the construction company were better informed about the status of the project as opposed to their senior management colleagues.

It is therefore important for organisations and their employees to ensure that they have effective information management and sharing practices in place, so that they are able deal with their information effectively and efficiently in order conduct the organisation’s core business goals (Kirk 1999). This, in turn, raises crucial discussion points for the construction industry which include: the understanding of the importance of information management and sharing in construction; the awareness of information management and sharing in its own right rather than under the guise of construction management; the perceptions of information management and sharing of stakeholders within the construction industry; and the influence that a construction company’s information management and sharing policies have on stakeholders. Each of the following aspects is in itself important, but ultimately, can any of the above aspects guarantee a successful construction project delivered on time and within budget? This leads to perhaps the most significant question in relation to information management and sharing within the construction industry: Can the construction industry make use of effective information management and sharing practices in order to successfully deliver a construction project that meets all the required specifications?
Chapter One: Introduction

1.4 Problem Domain

The discussion mentioned in Section 1.3 have subsequently led the researcher to the problem domain. As suggested by Rezgui (2001), Björk (2002) and Froese (2010), the construction industry requires a deeper understanding of information management and sharing practices, and more specifically, how they can use these principles and tools to assist them with the successful completion of construction projects that are able to meet all the required project specifications. The focus of this study is on the information management and sharing practices of a team of stakeholders as they complete a vital process towards the end of a construction project rather than the entire construction process. The researcher is interested in how information is managed and shared amongst a core team of stakeholders whose primary role is to inspect the building in order to identify items that they have been deemed not to meet the required specifications of the construction project.

With the importance of information management in organisations as discussed in Section 1.3, the findings from this study will benefit scholars from a number of fields and in particular, those involved in the information management and construction disciplines. These benefits are articulated via a conceptual framework that was be established from the extant literature to provide an evaluative lens to analyse the major concepts surrounding the management and sharing of information within a complex construction project (see Chapter 2.9). In addition, through the use of an information audit, the findings will also provide the current practices in the construction industry and the stakeholders involved with a greater insight into the defects inspection process from an information management and sharing perspective. Finally, this study is able to contribute to the broader field of information management research by investigating and extending the relationships between itself and the construction industry.

1.5 The Research Question

Previous studies conducted into information management within the construction industry have primarily focused upon the exploration of different stages within a construction project (Al-Sudairi 2007; Chen et al. 2008; Hwang et al. 2009; Xie et al. 2011 and Al Nahyan et al. 2012). To date, there has been limited, if any, studies
that have dealt directly with the defects inspection process from the perspective of the information management and sharing practices of the organisations and stakeholders involved. Studies that have been conducted into the defects inspection process have dealt with issues such as human error, quality management and/or the use of technology (Bentley 1981; Atkinson 1999; Gordon et al. 2003). Therefore, the researcher wishes to explore and report upon the information management and sharing practices during the defects inspection process, with particular focus on a team of core stakeholders involved in the process. This motivation has led to the development of the following question:

*How is information managed and shared within a complex construction process?*

This also raises the following sub-questions:

*What role do information management and sharing play within a construction project, in particular the defects inspection process?*

*What role do knowledge and experience play in the management and sharing of this information?*

By undertaking this research, we can identify how these stakeholders are able to manage and share the information during the defects inspection process of a complex construction process and the major factors (tacit and explicit knowledge, experience, and personal and enterprise information management) that influence this. However, it should be noted that the outcomes of this study do not aim to provide a solution to the information management and sharing practices within the defects inspection process, nor provide a detailed account of the tacit and explicit knowledge that each stakeholder possesses.

Nevertheless there is also potential to gain insight into the lessons learnt from this particular construction project and what can contribute to a better understanding of the defects inspection process from an information management and sharing perspective.

The objective of this study was not to re-write or change the actions or procedures involved in the defects inspection process as this may vary from stakeholder-to-stakeholder, project-to-project and organisation-to-organisation. Nor is it to define
what steps should be taken within the defects inspection process. Instead, there were two main objectives of this research. The first was to explore the “images” that the organisations and stakeholders involved in the defects inspection process portrayed and the implications that these had towards the management and sharing of information (Kirk 1999). Whereas the second was to document, via the use of an information audit, the information management and sharing practices of a team of stakeholders as they completed the defects inspections for a complex construction project.

1.6 Research Approach and Reporting of Findings

The nature of this study suggested that a qualitative research approach needed to be adopted as it was exploratory in nature, the variables were not yet known; context was important and there was a lack of theory (Creswell 2013). In addition, the application of the qualitative research approach facilitated a richer understanding of the phenomena under investigation. An interpretative perspective was also adopted as it focuses on the complexity of human sense making as the situation emerges and attempts to understand the meanings people assign to them (Walsham 1995a; Christie et al. 2000).

In order to facilitate clarity and to provide some boundaries for the study, a case study approach was adopted. By doing so, it allowed the researcher to identify what it was the stakeholders were doing in their own words. Benbasat et al. (1987, p. 370) and Stake (2000) noted that the application of a case study lends itself to the exploration of ‘a phenomenon in its natural setting, employing multiple methods of data collection to gather information for one or a few entities’. Furthermore, the benefits of using a case study in developing a deeper understanding of the phenomena under investigation is that its method usually focuses on one or a few cases to provide a representation of other typical cases. Borg and Gall (1989) alongside Denscombe (1998) and Yin (2009, 2014) suggest that through the use of a case study, the researcher is able to cover a small scope of the case and is therefore able to investigate that case in greater detail. Finally, by being immersed in the organisational activities, the researcher is able to gain richer information as to how
the stakeholders involved in the defects inspection stage of a complex construction project managed and shared information.

As the study involved the investigation of the information management and sharing practices of a team of stakeholders during the defects inspection process, an interpretive lens needed to be applied in order comprehend the data being presented. This was achieved via the execution of an information audit. As indicated by Orna (1990, 1999 and 2004), Dubois (1995), Henczel (2001a) and Botha & Boon (2003), the use of an information audit allows the researcher to gain a greater understanding of the current information environment. This understanding can be achieved by: facilitating the mapping and identification of information flows both internally and externally, identifying what information was being supplied including any gaps, inconsistencies, bottlenecks and duplications; working out what information was required to meet the needs of the both the organisation and process, and the documentation of the information in relation and the stakeholders’ decision making process (Henczel 2001a).

The study involved the researcher working closely with a team of stakeholders, in particular, the architects and builders as they inspected a purpose-built academic building for defects. Over an intensive fourteen-week period the researcher was involved in thirty-six on-site observation sessions, each lasting for a period of two hours. During these sessions two experienced researchers were also invited to participate in order to validate the primary investigator’s observations. This was particularly important as one possessed specific domain knowledge in information and the other in construction. In addition to the on-site observations, both formal and informal interviews and discussions were conducted with the stakeholders. These were often used to clarify any observations seen previously or to gain further insight into what was happening.

In addition to the on-site observation sessions and interviews, sample documentation was also collected, which included stakeholders’ personal notes as well as any templates used in the defect inspection stage. These documents were used to provide evidence and verify both the on-site observations and the follow-up interviews conducted with the stakeholders.
Each iteration involved feedback, re-discussion of observations and re-questioning of the participants to validate observations and conclusions of the researcher throughout the process. The data collected was interpreted through a hermeneutic lens of feedback, interpretation, observation, interpretation and re-interpretation. In addition, NVivo was use to organise and analyse the data collected. It allowed the researcher to identify trends and cross-examine the data through a series of queries, which in turn led to series of conclusions.

Academic rigour was maintained through the triangulation of the data collection process, in which data went through a verification stage by third parties via a novel method of experienced investigators ‘observing the observing’. At the conclusion of each observation session, investigators would compare notes to see if what had been observed concurred with one another. It also provided a useful check and balance through the data collection stages.

Many of the findings from this case study were presented in three ways, with the first presented in the form of a series of vignettes (Stake 1985). These vignettes were obtained via the on-site observation sessions and contained specific examples in order for the researcher to demonstrate detail and to capture texture. The second involved making use of direct quotes obtained from the follow-up interview sessions, these quotes enabled the researcher to verify the on-site observations and to gain further insight into the phenomena that was being investigated. Finally, data was also presented in the form of illustrative diagrams that were derived from conducting an information audit of the defects inspection process.

1.7 Thesis Structure

This thesis contains ten chapters in total. The following chapters are summarised briefly in this section.

Chapter Two:

Chapter Two begins by providing a critical review of the literature on information management, information sharing and information audits. It then proceeds to focus on the literature surrounding the construction industry, with specific focus on the
defects inspection process. Finally it concludes by presenting the theoretical conceptual lens by which the study is evaluated.

**Chapter Three:**

Chapter Three discusses in detail the methodological approach taken within this research. It takes into consideration the nature of the study and the research questions posed in order to select the most appropriate approach. After careful consideration, a qualitative research approach was adopted whereby an interpretative perspective was selected. A single case study methodology was employed, where multiple methods including document analysis, observations and interviews were implemented. Chapter Three also describes the methods in which key findings were analysed and reported through the use of a software application (NVivo) and the Hermeneutic Cycle. Finally, the chapter concludes by addressing ethical, reliability and validity issues.

**Chapter Four:**

Chapters Four, Five, Six, Seven and Eight present the research in context – in other words, the major findings as a result of conducting the study. Each proceeding chapter deals with a specific factor that influenced the way in which stakeholders managed and shared information during the defects inspection process. At the conclusion of each chapter, findings are considered against the current state of critical literature (Chapter Two) to provide further analysis and discussion on the role of information management and sharing during the defects inspection process for this complex construction project.

Chapter Four presents the findings as a result of completing the information audit during the defects inspection process. It provides a clear understanding of how this process was undertaken including the roles and responsibilities of each stakeholder. In total, the information audit was able to identify and map seven core sub-processes and sixteen separate lists created as a direct result of conducting the defects inspections. This was then supplemented by an additional sub-process and eight informal lists that were created and maintained by the stakeholders. The creation of the additional sub-process and lists enabled the stakeholders to make sense of, or to deal with, the complexity and volume of information created and disseminated.
during the defects inspection process. They also assisted the stakeholders to meet the needs of their own organisational information management requirements. Finally the findings established the fact that the defects inspection process was complex in nature and did not follow a linear model as understood by one of the major stakeholders. Rather, it took on an iterative approach whereby stakeholders were constantly cycling through identifying and rectifying defects.

**Chapter Five:**

This chapter examines the stakeholders’ use of tacit knowledge to manage and share information during the defects inspection process. Specific examples of its use were provided through a series of vignettes and then cross referenced against the interviews conducted with the individual stakeholders. The findings indicated that stakeholders dealt with the use of tacit knowledge to manage and share information differently according to their experiences, specific domain knowledge and their reliance on explicit forms of documentation (explicit knowledge). Stakeholders who possessed greater amounts of experience tended to rely upon the use of their tacit knowledge to manage and share information whereas less experienced stakeholders tended to make reference to explicit forms of documents. This chapter concludes by relating the findings to Goffman’s (1959) dramaturgical prospective and the presentation of a generalised model which includes Nonaka’s (1994) SECI model to demonstrate the stakeholders’ use of tacit knowledge to manage and share information.

**Chapter Six:**

This chapter examines the stakeholders’ use of explicit knowledge (explicit forms of documentation) to manage and share information during the defects inspection process. Similar to that of Chapter Five, specific examples of its use were provided through a series of vignettes and then cross referenced against the interviews conducted with the individual stakeholders. The findings indicated that stakeholders made use of explicit forms of documentation (explicit knowledge) to deal with the volume of information presented to them due to the complex nature of the building. It also served as a form of insurance whereby stakeholders were able to protect themselves from any possible liabilities as a direct result of
conducting the defects inspections. Stakeholder who possessed lesser amounts of experience were also able to make use of explicit forms of documentation as a point of reference in order to resolve any issues or conflicts as they arise. Chapter Six also highlighted the fact that the stakeholders’ role during the defects inspection process had a direct influence in the way they would make use of explicit forms of documentation to manage and share information.

Chapter Seven:

This chapter examines the stakeholders’ use of experience to manage and share information during the defects inspection process. Once again, specific examples of its use were provided through a series of vignettes and then crossed-referenced against the interviews conducted with the individual stakeholders. The findings indicated that experience played a vital role in the management and sharing of information. Although stakeholders possessed differing levels of experience, there were similarities in the way the made use of it. Through its use, stakeholders were able to make judgements and alter the way in which they managed and shared information according to the environment they worked within. Stakeholders who possessed lesser amounts of experience in construction were able to identify greater amounts of items that they deemed to be defective, whereas more experienced stakeholders tended to make use of their experience to judge the same items as being acceptable and within normal range. Chapter Seven also highlighted the fact that, through the use of their experience, stakeholders were able to reduce the number of delays caused by information management and sharing difficulties.

Chapter Eight:

This chapter provides an in-depth examination of the stakeholders’ personal information management practices as opposed to that of the enterprise information management practices adopted by their organisations. Through document collection, observation sessions and interviews, the researcher was able to map the individual stakeholder’s personal information management practices against that of the enterprise information management approach enforced by the builders. The findings indicated that although stakeholders could possess similar profiles (job and demographics) they would ultimately exhibit many differences in the way the
managed and shared the information. The findings also highlighted the fact that stakeholders utilised a combination of personal and enterprise information management practices to manage and share information. This, in turn, allowed them to deal with the physical environment and the short timeframe in which they operated. It also allowed them to contextualise and add value to the information they possessed.

**Chapter Nine:**

This chapter discusses and summaries the major themes related to the management and sharing of information during a complex construction project process. In total, four major themes were identified. These included: the complex and iterative nature of the defects inspection process; the central role of knowledge in the management and sharing of information; the role of experience in the management and sharing of information; and finally, the personal versus enterprise information management practices. Chapter Nine suggests that each of these themes alone is important in their own right however, together, they are able to provide a deeper understanding of the information management and sharing practices of the stakeholders involved in the defects inspection process.

**Chapter Ten:**

This chapter begins by re-iterating the context in which the study was conducted. It then proceeds to discuss the implications for the construction industry, with a particular focus on the defects inspection process, including its practice, theory, and future research. Chapter Ten concludes by considering the limitations of the study and provides a brief summary of this thesis.
2 Literature Review

2.1 Introduction

This chapter explores the existing research and theoretical literature in order to inform the approach taken within this study and to provide a conceptual framework to answer the research question: 'How is information managed and shared within a complex construction project?' The exploration begins with an analysis of the existing research surrounding information and organisations with an emphasis on the images of organisations and their implications towards information, personal and enterprise information management, and information sharing. It then focuses upon the use of experience and domain-specific knowledge to manage and share information through the use of tacit and explicit knowledge. Towards the latter part of this chapter, the existing literature surrounding information management and sharing within the construction industry will be examined. Finally, by identifying gaps in the literature, the researcher is able to develop a conceptual framework to detect the information management and sharing practices that occur within the construction industry with a particular emphasis on the defects inspection process.

In situating this study, the objective of this research is not to examine the information management and sharing practices of the entire construction process, nor is it to examine the tacit and explicit knowledge of the organisations and stakeholders involved. Instead, the researcher is interested in the role and factors that influence the information management and sharing practices of the stakeholders as they complete one process within a complex construction project.

2.2 Information and Organisations

Information can be seen as an integral part of any organisation and one of the most valuable assets that it may possess (Burk & Horton 1988; Best 1996; Owens et al. 1997; El-Tawy & Abdel-Kader 2013). With this in mind, organisations have become increasingly aware of its potential and how it can be utilised to provide a competitive advantage and sustain their success. Irrespective of an organisation’s industry or domain, information has the ability to facilitate operations,
communication, planning, and decision-making that would ultimately be beneficial to itself, clients and any other entities that may interact with it (Porter 1985, 1997; Porter & Millar 1985; Kaye 1995; Choo 1996, 1998; Buchanan & Gibb 1998; Sohal & Fitzpatrick 2002; Veloutsou et al. 2004; Jenkinson 2006; Iaryczower & Shum 2012; Kousky & Cooke 2012).

Davenport and Pruzak (2000) suggest that as organisations begin to create, accumulate, store and disseminate knowledge (which can be argued to be information until such time as context and meaning is applied (Ackoff 1989)), they tend to lose sight of how to manage it, and what information they and their employees actually possess. In addition, Edmunds and Morris (2000, p. 20) state that: ‘during the last century, developments in communication systems [have] led directly to an increase in the amount of information in the workplace’. With this increased amount of information, organisations are now faced with the reality of not only dealing with the traditional paper-based documents, but now are also dealing with an abundance of unstructured data such as emails and images (Lewis 1996; Blumberg & Atre 2003).

To assist with the understanding of the complex relationship between organisations and information management, Kirk (1999) examined the number of images used to describe an organisation and proceeded to draw their implications towards the management information. During this examination, Kirk (1999) drew upon the four familiar and conventional images of organisations (machines, organisms, political systems and cultures) of Morgan (1986) and an additional fifth image of learner as suggested by Senge (1990), with each image representing a perspective on the nature of organisations. Table 2.1 provides a summary of Kirk’s (1999) images of an organisation and their implications towards information management.
## Implications to information management

<table>
<thead>
<tr>
<th>Image of an organisation</th>
<th>Implications to information management</th>
</tr>
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<tbody>
<tr>
<td>Machine</td>
<td>Through the interpretive lens of a machine, Kirk suggests that information is one of the most vital resources that enables the wheels of an organisation to tick over and that the goal of managing the information is to ensure that information is delivered where and when it is needed through clearly defined and understood communication channels.</td>
</tr>
<tr>
<td>Organism</td>
<td>In adopting the organism image of an organisation, Kirk suggests that the information from both external and internal sources are required to keep the organisation in a state of equilibrium. The role of information management in this instance is to draw information about trends and developments from the external environment in order to respond to the constant changes triggered by economic, social, technological and legislative forces.</td>
</tr>
<tr>
<td>Political system</td>
<td>The political system image of an organisation recognises that various groups within an organisation will have differing needs and therefore seek to make use of the information in varying forms in the exercise of power and influence. It can also be used to seek support and negotiate conflict. Kirk suggests that this image can be used as a reminder of the political and social context of information management and its ability to highlight the ethics of information management practice.</td>
</tr>
<tr>
<td>Culture</td>
<td>Kirk suggests that the image of the organisation as culture contains very powerful connotations as it encompasses, norms and meanings, values and shared beliefs with particular emphasis on rituals, myths, language and symbol. The use of information in an organisation will certainly contain cultural aspects in contrast to the assumption that the use of it is essentially a human activity. The management of information in this instance can be seen as having a clear role in sense making and through its practice, portray the beliefs and values of the organisation.</td>
</tr>
</tbody>
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Chapter Two: Literature Review

Information Management and Sharing Practices within a Construction Project Process

Huan Cong Vo-Tran

### Table 2-1: A summary Kirk’s (1999) images of an organisation and their implications towards information management

<table>
<thead>
<tr>
<th>Image of an organisation</th>
<th>Implications to information management</th>
</tr>
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<tbody>
<tr>
<td>Learner</td>
<td>The image of the organisation as a learner suggests that it is a community that has the ability to regenerate itself through the creation of knowledge as an outcome of learning. The management of information needs to ensure that the organisation possesses the information and information capabilities necessary in order to continuously adapt to the ever-changing internal and external environments. This can be achieved by adopting a forward-looking approach by being able to adjust itself to ambiguity and uncertainties found in these environments.</td>
</tr>
</tbody>
</table>

Through the examination of the five images of an organisation, Kirk (1999) suggests that none of the images alone was able to provide an accurate representation of the implications of information management in organisations. However, what it does indicate is the complexity of organisations and the processes required to sustain them. Through this understanding, Kirk (1999, p. 3) was able to list five implications for information management that emerged from these images of organisations. They included:

1. Information management has the potential to contribute to the achievements of organisations.
2. Information management has different purposes in different organisations. These purposes will be influenced by the organisation's goals as well as by its culture and its stance on information.
3. Information management is practised in a political, social and cultural context which shapes both what information management does and how it does it.
4. Information management practice is value laden and so it has an ethical dimension. The ethics of information management practice are most often implicit.
5. Organisational learning concepts and theory are applicable to information management in some organisations. Not all organisations are ready for this development, nor is it an appropriate direction for all organisations.
It is evident then that information management practices and procedures often differ from one organisation to another and within these organisations. Differences could also be identified between one department to another and more importantly, from one person to another. Although Kirk’s (1999) work touched upon how individuals made use of information in organisations, it did not provide an examination of the personal information management strategies adopted in order to meet an organisation’s objectives. Nor did it attempt to explore the enterprise information management practices of organisations.

2.3 Personal Information Management

Jones (2007, p. 463) suggests that the ‘concept of personal information management is easy to describe and discuss, for we all do it and we all have had first-hand experiences with its challenges. But much harder to define.’ Currently there are numerous definitions associated with personal information management, with some being more detailed than others. Some of the major ones include:

Lansdale (1988, p. 55):

*The methods and procedures by which we handle, categorise and retrieve information from a day-to-day basis.*


*An information management system developed by or created for an individual or personal use in a work environment. It includes a person’s methods and rules for acquiring the information which becomes part of the system, the mechanisms for organising and storing information, the rules and procedures for maintaining the system, the mechanisms for retrieval, and the procedures for producing the various outputs required.*

Bergman et al. (2004, p. 1598):

*Personal Information Management (PIM) is the management of information (e.g. files, emails and bookmarks) by an individual in support of his/her roles and tasks.*
Huan Cong Vo-Tran

Chapter Two: Literature Review

Jones (2007, p. 453):

*Personal Information Management (PIM) refers to both the practice and study of the activities a person performs in order to acquire or create, store, organize, maintain, retrieve, use and distribute information the information needed to complete the tasks (work-related or not) and fulfil various roles and responsibilities (for example, as parent, employee, friend, or community member). PIM places special emphasis on the organization and maintenance of personal information collections (PICs) in which information items, such as paper documents, e-mail messages, web references, and handwritten notes are stored for later use and repeated reuse.*

From the examination of the major definitions provided by Lansdale (1988), Barreau (1995), Bergman et al. (2004) and Jones (2007), it can be seen that a majority of the definitions refer to the systems and procedures an individual has in place in order to manage the information to support them with their roles and tasks. In addition, Boardman (2004, p. 13) noted that ‘many definitions of PIM draw from a traditional information management perspective – that information is stored so that it can be retrieved at a later date.’

Modern dialogue with respect to personal information management began with Bush’s (1945) article ‘As We May Think’. In this article Bush first presented his vision of a Memex device whereby it could greatly increase a person’s ability to record, retrieve and interrelate information. As time progressed and advancements in information management and its associated tools were made, Licklider (1960, 1965), Engelbart (1963) and Nelson (1992) were able to advance the notion of personal information management through the use of the computer. However, it was not until the late 1980s whereby the phrase ‘Personal Information Management’ was first coined by Lansdale (1988) as there was much excitement over the potential of the personal computer to extend humans’ ability to process information and, to enhance human intellect. Since then, Bergman et al. (2004) has reported that there has been limited research into personal information management, with previous works focusing on personal information management within the context of specific tools such as databases, paper documents, the web.
and email (Allen 2001; Whittaker & Hirschberg 2001; Jones et al. 2002; Gwizdka 2004). However, only a few years later, Jones (2007, p. 454) reported that there had been a ‘revival of interest in PIM as an area of serious inquiry that draws upon the best work from a range of disciplines including cognitive psychology, human-computer interaction, database management, artificial intelligence, information and knowledge management, information retrieval, and information science’. Jones (2007) then proceeds to propose that the renewed interest in personal information management was spurred on by an increased awareness of the developments in technology and tools (Bellotti et al. 2005; Whittaker 2005).

The literature surrounding personal information management has also extended to include research into systems and how people make use of them. Earlier studies conducted by Carroll (1987) and Barreau (1995) report that there has been limited research into this area. However, due to the advancements in technology and the greater amount of data being generated, research into personal information management has gained considerable attention with studies being conducted into areas such as: “personal information management practices for an online faculty”, and “folders versus tagging preferences in personal information management” Jones (2007, 2010), Bergman et al. (2013) and Kearns et al. (2014).

Previous research conducted by Carroll (1987), Barreau (1995) and Jones (2010) suggests that system users are frequently employing satisficing strategies whereby they are concentrating more upon accomplishing job-related tasks rather than spending time and becoming more proficient in the system itself. Furthermore, Marchionini (1997) suggested that it is generally accepted that users will tend to use what is convenient and generally accessible as opposed to seeking out other sources that may be more appropriate but not as easily obtainable.

In an attempt to expand the literature surrounding systems and how people make use of them, Barreau (1995) embarked upon a study which investigated the classification behaviours of seven managers with respect to electronic documents and evaluated them against the factors that Kwasnik (1989) observed for physical documents in an office. The findings from this study concluded that the classification behaviours exhibited by the managers were ‘influenced by the
hardware and software environment and may impact personal as well as organisational efficiency’ (Barreau 1995, p. 327).

In contrast to the works of Carroll (1987), and Barreau (1995), Gwizdka and Chignell’s (2007) study approached personal information management from the perspective of individual differences. In completing this study, Gwizdka and Chignell (2007) concluded that the unique factors and situations of individuals (job requirements, information tools and work structures), influence their personal information management needs and practices which, in turn, assists them with the selection of the personal information management tool which suits them best. The findings also indicated that ‘people who have quite similar profiles with respect to job and demographics can exhibit huge observable differences in PIM-related behaviours, their choices of strategies and choice in tools’ (Gwizdka & Chignell 2007, p. 207).

Pratt et al. (2006) propose that there can be much potential in gaining a greater understanding of personal information management practices, specifically in domains such as intelligence analysis or medical informatics. Through an improved understanding, Pratt et al. (2006) suggest that medical professionals such as doctors and nurses can be provided with the ability to better balance their already large and varied caseloads. Furthermore, there could be an even greater impact if personal information management support is provided for individuals who are undergoing long-term or sustained treatments for chronic or acute health conditions. This then raises the question: Can a greater understanding of personal information management practices be beneficial to the construction industry where individuals are constantly dealing with large volumes of complex information? To date, limited or no research has been done.

2.3.1 The Problems Associated with Personal Information Management

Studies conducted by Erickson (2006), Gwizdka and Chignell (2007) and Jones (2007, 2010) suggest that, although the overall goal of personal information management is to organise information so that individuals are able to successfully achieve their roles or tasks, this is not always the case. According to Jones (2010), one of the biggest problems that we face in terms of personal information
management is that we live in the real world. In doing so, we are not always able to find the right information to meet our current needs. This information cannot always be found or arrives too late to be deemed useful. On the contrary, information might arrive too soon and therefore be misplaced or forgotten entirely before a suitable opportunity presents itself for its application.

In addition, Jones (2007) also suggests that developments and advancements made with the technologies and tools supporting personal information management has also played a contributing factor. As much as they can promise and assist users, invariably they create new problems and further exacerbate existing ones too. Information that once existed only in paper form can now be dispersed in multiple versions both as paper and digital copies. To add to the situation, ‘digital information is further also scattered onto “information islands” with each being supported by a separate application or device’ (Jones 2007, p. 455). However, in recent times, the notion of ‘information island’ may not be such a factor as digital information can now be stored, updated and retrieved from ‘the cloud’. Nevertheless, the introduction of this technology, like those before it, brings forth its own sets of complications for personal information management. These include issues such as privacy, security and ownership (Bertino et al. 2009; Pearson 2009; Armbrust et al. 2010; Popovic & Hocenski 2010).

From an information sharing perspective, Erickson (2006) suggests that personal information management is usually a private task whereby individuals create personalised information with sharing in mind. However, the sharing of this personalised information can lead to many problems, especially if it involves work practices. For example, case notes on a patient that is shared amongst several health professionals. If these clinical notes are messy and not well organised, proper diagnosis and treatment of the patient may not be possible. This in turn raises complex ethical, legal and practical questions concerning privacy, access and ownership (Erickson 2006). The sharing of personal information is not just limited to formal information sharing arrangements such as the example provided above. Personal information can also be shared amongst family and friends. For example, students sharing class notes, or the handing down of recipes from one family member to another. The sharing of this personalised information can sometimes
cause ‘tensions between the ends for which it is shared and not-necessarily the desirable symbolic inferences it may support’ (Erickson 2006, p. 74).

2.4 Enterprise Information Management

According to Gartz (2004), enterprise information management which can also be referred to as corporate or collaborative information management, deals with how organisations (enterprises) manage their information as opposed to that of individuals. It can be seen as a relatively new concept whereby it is formed through the combination of two existing approaches to managing information, namely, business intelligence and enterprise content management. By combining these two approaches, enterprise information management is able to take an organisation’s information one step further by approaching it from an enterprise-wide perspective (van der Lans & van Til 2013).

Bonnati, as cited by van der Lans & van Til (2013), suggested that the earlier attempts at defining the concept of enterprise information management by means of combining the definitions of business intelligence and enterprise information management seemed ‘old-fashioned’ as the emphasis was more upon business management rather than architecture. Instead, Bonnati who worked for IBM Italy and was seen as a pioneer in coming up with a changed insight into the definition of enterprise information management (van der Lans & van Til 2013) advocated Logan and Bill’s (2009) description of enterprise information management as it was an encompassing statement which was very close to the definition he had in mind. In defining enterprise information management, Logan and Bill (2009, p. 1) stated:

_EIM is an integrative discipline for structuring, describing and governing information assets across organizational and technological boundaries to improve efficiency, promote transparency, support agility and enable business insight. EIM is operationalised as a program with a defined charter, budget and resource plan. An EIM program implements the principles, models and requirements expressed within the organization’s enterprise information architecture._
Studies conducted by Logan & Bill (2009) and van der Lans and van Til (2013) have argued that the concept of enterprise information management is still in its infancy stage and that there was a lack in the required case studies, maturity models and frameworks to demonstrate the power of the concept. In order to address this, van der Lans and van Til (2013) developed an ‘EIM Triangle’ (see Figure 2.1) which serves as a model for organisations wishing to adopt an enterprise information management approach.

Figure 2-1: EIM Triangle (van der Lans & van Til 2013, p. 80)

The EIM Triangle model as shown in Figure 2-1 advocates information as being central to enterprise information management with the three main factors (people, technology and process) positioned on the exterior. It is these three factors that influence the four important aspects of: availability, accessibility, relevance and interpretability. Van der Lans and van Til (2013, p. 81) suggest that it is ‘these aspects that form the requirements that the information must meet, and in practice [it is these aspects] that also often lead to obstacles.’ However, the EIM Triangle model proposed by van der Lans & van Til by is relatively new and therefore has not been tested rigorously in practice or in research.
2.5 Information Sharing

Information Sharing is the process of exchanging information between two or more people or groups (Ford & Staples 2010; Ling et al. 2009). The information exchanged may come in the form of either tacit and/or explicit information (Ford & Staples 2010), which includes a mixture of both existing and newly generated information. A majority of the time, information sharing happens whilst employees or experts with specific domain knowledge in an organisation collaborate (Lilleoere & Hansen 2011). This process of exchanging and sharing information is important (Gigone & Hastie 1993). Previous research has indicated the importance of information sharing as it can be leveraged to create competitive advantages for the organisation (Porter 1997; Bryant 2005; Kanjanabootra et al. 2013).

The information shared amongst individuals does not always happen in an efficient manner and there are many factors that may affect this. An individual’s absorptive capacity as described by Reilly and Sharkey Scott (2010) is an example of such a factor. It involves the individual’s ability to interpret received information, utilise it, and turn it into meaningful action (Lilleoere & Hansen 2011). Without an understanding of the information presented, the individual would be rendered less effective in the information sharing process.

In addition to the individual’s absorptive capacity, Nonaka (1994) mentions that the ability to share tacit knowledge/information in an organisation requires social interactions between individuals through human activities. It is through these social interactions that individuals are able to form groups whereby they are presented with the opportunity to pursue new problems and solutions. These interaction groups can be drawn from within an organisation or amongst individuals formed outside the organisation. Furthermore, Nonaka (1994) suggests that in order for information sharing to be a success, there needs to be a combination of factors which include: trust among individuals in the group, the existence of a common perspective that each individual has towards the group and towards dialog or individual communications.

Later studies conducted by van den Hooff and Huysman (2009), and Holste and Fields (2010) also suggest that trust played a pivotal role in the success of
information sharing. In the van den Hooff and Huysman (2009) study, the findings indicated that an organisation’s culture had an effect on organisational information sharing, that is, the more interactions that the employees had with each other, the higher the trust. This conclusion was echoed in a study conducted by Holste and Fields (2010) which built upon the works of Nonaka (1994). In Holste and Fields’ (2010) study, the relationship between trust and information sharing was examined at an international organisation. The research reported that warm relationships and respect are most likely to develop through face-to-face interactions amongst workers, and that trust directly affected the willingness of an individual to share tacit information.

2.6 Information Audits

The information audit has long been seen as an important tool within the information management field, extending the concept of auditing holistically from the traditional scope of accounting and finance. It has been used extensively by information professionals and in libraries as an improvement tool however, it has also been applied successfully to other industries and organisations such as aviation and pharmaceuticals (Ellis et al. 1993).

In order for an organisation to achieve high performance it is stated that, ‘effective information management is the key’ (Rogalski 2006, p. 1), but the sheer amount of unstructured data being created by today’s organisations present it with many challenges. Rogalski (2006, p. 1) argues that: ‘finding the right information is difficult, information is not well leveraged among partners and it is not coming together in ways that will yield useful new insights’. However, before an organisation can effectively and efficiently manage the information that it may create, possess and disseminate, it must first complete an audit of current information practices.

According to Dubois (1995), information audits can be seen as a useful tool in information management whereby the results can be used to identify the contribution made by information to the work of an organisation, and in particular, its importance to decision making. Utilised properly, an information audit gives the user the ability to: ‘identify resources, services and information flows; verify the
existence of appropriate resources; rationalise resources; control costs; improving the marketability of services by increased visibility and exploiting the resulting improvements (Dubois 1995, p. 21).

2.6.1 Information Audit Definitions

Over the last three decades there have been many attempts to define what an information audit is, and what it should encompass. Yet to date, there is still no universal consensus (Griffiths 2010). Early information audit definitions (Reynolds 1980; Burk & Horton 1988) tended to focus more on formal information sources with a strong emphasis on document management, while later approaches (Buchanan & Gibb 1998; Orna 1999; Henczel 2001a) have moved away from this narrow approach and begun to recognise and incorporate the importance of organisational approaches and the broad range of information resources. In order to demonstrate the various definitions of the information audit, an examination of the major definitions are subsequently provided:

St. Clair (1997, p. 5):

A process that examines how well the organisation’s information needs and deliverables connects with the organisational missions, needs, goals and objectives.

St. Clair’s (1997) definition of an information audit makes reference to organisations in general rather than being utilised within a library-specific context. It focuses more upon the organisational missions, needs, goals and objectives.

Buchanan and Gibb (1998, p. 34):

Discovering, monitoring and evaluating an organisation’s information resources in order to implement, maintain, or improve the organisation’s management of information.

Buchanan and Gibb’s (1998) approach can be seen as focusing more upon an organisation’s operational level in the management of its information rather than the strategic approach offered by St. Clair (1997) and Orna (1999).

Orna (1999, p. 69):
A systematic evaluation of information use, resources and flows, with verification by reference to both people and existing documents, in order to establish the extent to which they are contributing to an organisation’s objectives.

Orna’s (1999) definition makes reference to the end users of the information, their strategic objectives and advocates a systematic approach to conducting an information audit. However, Orna’s (1999) definition differs from that of the others by promoting a verification process. The verification process involves the reference to people and existing documentation in order to see how well they are contributing to the overall objectives of the organisation.

Henczel (2001b, p. 211):

_is a process that will effectively determine the current information environment by identifying what information is required to meet the needs of the organisation. It establishes what information is currently supplied, and allows matching of the two to identify gaps, inconsistencies and duplications. The process will also facilitate the mapping of information flows throughout the organisation and between the organisation and its external environment to enable the identification of bottlenecks and inefficiencies._

Henczel’s (2001b) definition of an information audit could be seen as the most comprehensive, building upon those that have come before it. It is able to incorporate a majority of the major concepts outlined by St. Clair (1997), Buchanan and Gibb (1998) and Orna (1999). However, what differentiates Henczel’s (2001b) definition from the others is that the definition involves mapping an organisation’s information flows both internally and externally, thus allowing the person(s) conducting the information audit to identify any bottlenecks and inefficiencies.

From the examination of the major definitions provided, it could be seen that a majority of the definitions focused upon the management of an organisation’s information in order for it to meet its strategic and operational objectives. However, as organisations are continually transforming and evolving to meet the requirements of their clients and the environment they operate within, additional consideration must be given to an organisation’s information resources such as the use of
information technology to effectively manage and share information. Finally, of the definitions discussed, it was only Orna’s (1999) definition that made specific reference to the creators and end users of an organisation’s information.

2.7 The Relationship between Experience and Knowledge

‘Without doubt, experience is a very important human resource’ (Herbig et al. 2001, p. 689). When applied in various work environments such as advanced manufacturing systems, the use of human experience can be seen as a necessity as it facilitates flexibly and effectiveness in unpredictable and critical situations (Carus et al. 1992; Carus & Schulze 1995). Through its use, it allows an individual to quickly evaluate the information presented before them to make timely and justified decisions (Taylor 1975).

Closely tied with the use of experience is the concept of domain-specific knowledge (Glaser 1984; Alexander & Judy 1988; Carey & Spelke 1994). As defined by Alexander and Judy (1988, p. 376), domain-specific knowledge can be described as ‘the declarative, procedural, or conditional knowledge one possesses relative to a particular field of study’. In other words, the ‘knowing that’ (declarative), ‘knowing how’ (procedural) and ‘knowing when and where’ (conditional) knowledge (Paris et al. 1983; Ryle 1949) that can operate at a tacit or explicit level (Alexander et al. 1991).

From a work perspective, both domain-specific knowledge and experience can be seen as being important as it assists with the acquisition of domain-related information (Walker 1987). Furthermore, studies conducted by Chi et al. (1982) and Siegler and Richards (1982) has demonstrated that domain-specific knowledge is an enabler for experts (individuals with a large amount of experience in a particular domain) to recognise domain-relevant patterns and automatically apply this to solve domain-related problems.

Within the context of information management and sharing, the use of experience and domain-specific knowledge has been reported in various domains (Perkins & Rao 1990; Kuhlthau 1999). In a study conducted by Perkins and Rao (1990) into the role of experience in information use and decision making, the authors suggest
that experience directly affects the way marketing managers (perceived to have domain-specific knowledge) acquire, manage and make use of information. Furthermore, the results indicated that there was a strong correlation between the amount of information used and the decisions themselves.

Kuhlthau (1999) conducted a longitudinal study into the role of experience in the information searching process for an early career information worker (securities analyst). Although the focus of the study was upon the participant’s information seeking processes, there were many underlying aspects that involved the management of information. From an information management perspective, the findings suggested that as the participant gained experience and knowledge within his specific domain, he began to see interactivity between the information sources that he utilised. The interactivity between the information sources was often complex in nature and therefore the participant soon realised that he needed to devise a method by which he could manage, organise and categorise them.

From a construction industry perspective, experience and domain-specific knowledge plays a pivotal role in the successful completion of a construction project (Zhi 1995; Josephson & Hammarlund 1999). Studies conducted by Odeh and Battaineh (2002), Assaf and Al-Hejji (2006) and Sambasivan and Soon (2007) suggest that one of the most important factors that causes delays in construction projects can be attributed to inadequate contractor experience. This factor is then exasperated by the competitive nature of the construction industry whereby the contract awarding procedure is often awarded to the lowest bidder. In doing so, the lowest bidder is often a local contractor who does not possess enough experience in working on larger, more complex construction projects that require a greater amount of domain-specific knowledge (Odeh & Battaineh 2002).

2.7.1 Experience-Guided Working

According to Carus et al. (1992) experience-guided working is a concept whereby individuals are able to make use of their prior experiences in order to guide their current work practices. However, Büssing & Herbig (2003) claim that this concept alone is not able to provide an accurate description of the ongoing acquisition of implicit knowledge that occurs whilst working. Instead, Büssing & Herbig (2003)
suggestion that, in order to provide an accurate description, the addition of the complementary sub-concepts of subjectifying and objectifying action (Böhle & Milkau 1988) is required.

From the perspective of a work psychologist, experience-guided working involves the ‘development of a holistic and flexible anticipation characteristic’ (Herbig et al. 2001, p. 689). In other words, the ability to integrate and re-interpret all the information and requirements in any given situation (Herbig et al. 2001). In addition, another necessary precondition for experience-guided working is the ability to apply certain ‘action patterns’ without the awareness of their individual parts. It is the separation of the use of ‘action patterns’ from automatic behaviour that is deemed important in experience-guided working as this separation can be seen as considerably more complex and quite flexible (Carus et al. 1992).

In exploring the concept of experience-guided working within a nursing context, Herbig et al. (2001) reported that there was a distinct relationship between the domain-specific knowledge, tacit knowledge and experience-guided working. Through the observation and interviewing of novice and expert nurses, Herbig et al. (2001, p. 690) propose that ‘concrete experience enhances implicit learning and therefore leads to complex tacit knowledge which enables people to deal with critical situations in their domain’. Furthermore, it is suggested that novices are bound to rely more upon the explicit learned knowledge and as their experience grows, so does their amount of tacit and domain-specific knowledge.

Carus et al. (1992, p. 424) suggests that in order for an individual to successfully apply the concept of experience-guided working, the following characteristics should be displayed:

- Perception through several senses and perception of diffuse, not exact defined information;
- Distributed attention;
- No separation between planning and execution; pragmatic stepwise procedure and practical testing;
Holistic action patterns render the sequential-analytic interpretation of essential information partially unnecessary and allow for a time-critical development of strategies even in unpredictable, chaotic situations.

To date, much of the literature surrounding experience-guided working has been predominantly in the domain of industrial production and nursing (Fleig & Schneider 1998; Herbig et al. 2001; Kucera 2010). Yet there have been limited, if any, studies conducted into experience-guided working within the domains of information management or construction.

2.7.2 Tacit Knowledge

In 1967 Polanyi described tacit knowledge as ‘knowing more than we can tell, or knowing how to do something without thinking about it, like riding a bicycle’ (Polanyi 1967, p. 4). It can be seen as unarticulated knowledge that resides within human beings, and is obtained by internal individual experiences such as reflection, internalisation or individual talents (Davenport & Pruzak 2000; Herrgard 2000). Tacit knowledge cannot be found in explicit materials such as manuals, books, databases or files (Smith 2001), and as difficult as it is to capture and codify, its substantial value is well worth the effort (Davenport & Pruzak 2000).

Works by Empson (1999, 2001) and Haldin-Herrgard (2000) have likened an organisation’s knowledge resources to an iceberg. They suggest that the structured explicit knowledge is the visible top part of the iceberg, which is easily identifiable and therefore much easier to share. However, the tacit knowledge component is momentous and is often locked underneath the surface, where it is invisible and hard to express. Furthermore, Brown and Duguid (1998) propose that an organisation’s core competency is more than the explicit knowledge (the ‘know-what’) that it possess, instead it requires more tacit (the ‘know-how’) to put the explicit knowledge into practice.

2.7.2.1 The Use of Tacit Knowledge in the Construction Industry

Over the last decade, the reporting on the use tacit knowledge in construction has received considerable attention in the literature from authors such as: Mohamed and Anumba (2006), Pathirage et al. (2007), Teerajetgul and Chareonngam (2008),
Chen and Mohamed (2010) and Khuzaimah and Hassan (2012). A majority of these studies have highlighted the importance of tacit knowledge within the construction domain and underline the significant contribution that it makes towards an organisation’s overall performance.

According to Mohamed and Anumba (2006), the construction industry is one whereby there is a strong orientation towards the completion of unique projects. Due to the uniqueness of each construction project where myriad variables such as personnel and building techniques are adopted, most of the knowledge generated is often experienced-based and tacit in nature. It can often be found embedded in the minds of the professionals and operative workers which, in turn, means that the potential for improving site management practices depends heavily on the right combination of knowledge and experiences.

Pathirage et al. (2007) explored the relationship between tacit knowledge and organisational performance from a construction industry perspective. The findings from this study indicated that the human factor and their use of tacit knowledge played a significant role as the construction industry could be seen as being labour and knowledge intensive. Pathirage et al. (2007) also suggest that valuable human knowledge resources were often wasted as many construction companies possessed limited understanding in the management of these precious resources to achieve improved organisational performance.

In investigating the use of tacit knowledge in Thai construction projects, Teerajetgul and Chareonngam (2008) advocated the findings of Mohamed and Anumba’s (2006), which suggested that a majority of the knowledge created during construction projects was tacit in nature. In doing so, Teerajetgul and Chareonngam (2008) provided an example of a construction manager and how their tacit knowledge was developed and internalised over a long period of working time. The tacit knowledge acquired by the construction manager was seen as being difficult to reproduce and transfer onto a document database (explicit form of knowledge) and thus, made it a challenging task to share amongst others. In concluding, it was suggested by Teerajetgul and Chareonngam (2008, p. 165) that ‘the ultimate goal is to enable individuals to make use of their tacit knowledge effectively’. This in
turn, suggests that an examination of their information management and sharing practices could be conducted to establish if these are contributing factors in the effective use of tacit knowledge.

Chen and Mohamed (2010) built upon the previous arguments within the knowledge management literature (Baumard 1999; Nonaka & Takeuchi 1995; Stacey 2001) and suggested that the use of tacit knowledge within the construction industry can be ‘perceived as the most strategically important resources that it owns and that it is the only renewable and sustainable base for its activities and competitiveness’ (Chen & Mohamed 2010, p. 138). The findings from their study were in-line with Nonaka and Takeuchi’s (1995) study whereby much of the knowledge in the construction industry is experience-based and created through sharing (and social interactions) of the duties on unique construction sites. Furthermore, the findings were also able to confirm the views of Pathirage et al. (2007). The study reported that the human factor (including social interactions) played an essential role in the use of tacit knowledge. It is through the application of this tacit knowledge that construction organisations are able to maintain a high level of performance.

Apart from the use of tacit knowledge in construction, studies have also been conducted into other domains such as medicine. Patel et al. (1999) conducted an in-depth study on medical knowledge and the cognitive processes which were thought to underlie diagnosis expertise. The findings from this study indicated that there were fundamental differences in the underlying mechanisms between tacit and explicit knowledge and that practitioners use of tacit knowledge depended on ‘well-informed biomedical knowledge structures’ (Patel et al. 1999, p. xii). That study also demonstrated that novice practitioners reasoned from biomedical knowledge and over a period of time and experience became sensitive to the patterns of evidence and outcomes. This allowed practitioners to become tuned to particular situations and were able to demonstrate their use of tacit knowledge through operating outside of their focal attention.

In another study, Cimino (1999) examined how different physicians: a novice (student), an intermediate (resident) and an expert (attending) made use of their...
experience and domain knowledge to complete the benchmark task of diagnosing the causes of chest pain. He suggested that experts tended to have a better sense of what information best fits a pattern (the symptoms exhibited by a patient) better than novices do, and that they were able to encode these patterns for later use. The findings from this study demonstrated that there were distinct differences between the novice and that of the intermediate or expert. Cimino concluded that the diagnosis of the novice was found to be less focused (due to the lack of experience and domain knowledge) and yet biased towards the confirmation of an earlier hypothesis they made whilst examining the patient.

2.7.3 Explicit Knowledge

Nonaka (1991, p. 98), states that: ‘Explicit knowledge is formal and systematic. For this reason, it can be easily communicated and shared, in product specifications or a scientific formula or a computer program’. From a work perspective, explicit knowledge is able to make the work environment predictable and guide the way in which the tasks are organised (Brown & Duguid 2000; Smith 2001). It differs from tacit knowledge as it is carefully codified, stored in a hierarchy of databases and can be accessed via high quality, reliable information retrieval systems (Smith 2001). Explicit knowledge is reusable (Zach 1999; Hansen et al., 2000; Lee & Yang 2000; Smith 2001; Harsh 2009), once codified, explicit knowledge can be used and reused to solve problems which display a similar nature or facilitates the connection of people with valuable, reusable knowledge (Smith 2001).

Effective performance and growth in knowledge-intensive organisations requires a great deal of integrating and sharing highly distributed knowledge (Penrose 1959; Demsetz 1988; Kogut & Zander 1992; Grant 1996; Zach 1999). Although tacit knowledge is developed naturally as a by-product of action, it is more easily exchanged, distributed or combined amongst communities of practice by being converted into explicit knowledge (Nonaka 1994). There have been many reported cases whereby the creation and use of explicit knowledge has greatly assisted organisations with their performance and growth. In a study conducted into the success of Mrs Fields Cookies, Schember (1991) reported that Mrs Fields Cookies was able to develop a process knowledge (in this instance baking cookies) to a level
that was sufficiently high enough to be explicated and articulated into a recipe that could consistently produce cookies of a high quality – with some claiming that they were almost as good as the cookies baked by Debbie Fields herself. However, Zach (1999) suggests that although explicit knowledge plays a critical role in the global strategy of an organisation, it only forms part of the overall intellectual landscape. Zach (1999) then proceeds and argues that explicit knowledge works well in organisations that operate on routineness and patterns, but where imagination and flexibility are important (such as an architectural or construction firms), knowledge routinisation may be deemed as being inappropriate or hindering the creativity process.

2.7.3.1 The Use of Explicit Knowledge in the Construction Industry

In contrast to the use of tacit knowledge in the construction industry, research into the use of explicit knowledge has been limited, and has tended to focus more upon its management from an IT perspective (Slaughter 1998; Gann & Salter 2000; Hardin 2011) rather than its use (Pathirage et al. 2007). However, it is in the opinion of the researcher that the use of explicit knowledge (explicit forms of documentation) can and should be seen as a vital component in any construction project. Throughout the life-cycle of a construction project, many different forms of documentation (drawings, schedules, standards contracts and specification) are created, updated and utilised. Davis et al. (1989), Love et al. (2000) and Tilley (2005) have all reported that if a project’s documentation is of a poor quality then it is can be seen as ‘being a major factor in reducing the overall performance and efficiency of construction projects as well as being directly responsible for many projects running over budget, over time and being plagued with rework, variations and disputation’ (Tilley. 2005, p. 283).

2.8 The Construction Process

According to Terrajetgul and Chareonngam (2008), the construction industry is regarded as a very competitive business where there are high risks and low profit margins. Most construction projects are both unique and fast moving in nature, and therefore construction companies are required to be dynamic with the ability to be
restructured over and over again with different designs, designers, management, equipment and crews (Oglesby et al. 1989; Sauer et al. 2001).

The construction process can be seen as being complex, encompassing a vast number of process and sub-processes. It is one whereby the stakeholders involved bring about their resources in order to complete a project within an agreed timeframe (Andrews et al. 2006). Although the stakeholders may vary from project-to-project, a typical construction project would include: clients, project managers, architects, consulting engineers, builders, contractors and sub-contractors, suppliers and users.

The construction process can be examined from different points of view and can often be explained differently. For example, from a business point of view, the construction process includes a business case, conceptual designs, detailed designs, bidding preparations, bidding, awarding of contracts, build, handover and operations. Within this, the design process itself also contains large amounts of sub-processes such as requirements gathering, calculations, design layout and specifications determination. Conversely, from a builder’s point of view, the construction process includes pre-construction, shop drawing reviews, site setout marking, build, inspections and rectification (Chinyio & Olomolaiye 2010).

The construction process can often be seen as being fragmented and differentiated via a multitude of stakeholders’ roles and the multiplicity of processes involved. This, in turn, has a direct effect on the type of project delivery systems in use, and the way the building contract has been drafted up i.e. design-build or design-bid build. (Chinyio & Olomolaiye 2010). Furthermore, (Marco 2011) suggests that the role of the stakeholders and the scope of the works in a construction project can greatly vary the type of delivery systems in place.

Embedded within every construction project is the inspection phase. It is a process by which stakeholders carry out checking procedures to ensure that the building that is being constructed meets the agreed project requirements (Merritt & Ricketts 2001). These requirements include designs, specifications, contracts, documents, appearance, building codes, and functionalities and happen within the agreed time-frame. The inspection process requires specific benchmarking or checklists that
each stakeholder needs to inspect the building against. This benchmarking and checklists form part of the information captured as essential and needed for the project. This information has to be carefully managed to enable integration of the complex parts of the construction process. Much of the information is tacit (Shelbourn et al. 2006, Tuuli et al. 2010) and held within the domains of the various stakeholders.

2.8.1 The Defects Inspection Process

The defects inspection process can be seen as a vital process within any construction project as its primary role is to identify and rectify any items that can directly affect the performance of a structure (Gatlin 2013). Within a residential context (residential dwellings i.e. houses), the costs associated with the identification and rectification of defects amounts to an average 4% of the total contract price (Mills et al. 1999), whereas the costs of defects during the production of a building project (commercial buildings) is stated to be between two and six percent of the total production cost (Josephson & Hammarlund 1999). Although the process of identifying defective items can be subjective, Gatlin (2013, p. 1) provides the following examples to demonstrate the categories that a construction defect may fall within:

- A design that fails to meet the Professional Standard of Care;
- A design that was not prepared in accordance with the applicable building codes;
- The failure of the contractor to execute the work in accordance with the plans and specifications;
- The failure of the contractor to execute the work in accordance with the acceptable standards of workmanship in the construction industry;
- The improper installation of systems, equipment or materials that are of a lesser quality than required by the plans and specifications.

According to Chong and Low (2005, p. 283), ‘construction defects are always the key concern for the construction industry’. However, that being said, ‘most defect research concentrates on materials and systems, examining different types of defects under given conditions and determining methods on how to detect them. As
a result, these researches are generally focused on technical and technological issues’ (Chong & Low 2005, p. 283).

To date, much of the research that has been conducted into the defects inspection process in relation to information management and sharing practices have been limited or non-existent. Existing studies in the area have primarily dealt with issues such as human error, quality management and/or the use of technology (Atkinson 1999; Bentley 1981; Gordon et al. 2003).

In a study conducted into the causes of costs of defects in construction, Josephson and Hammarlund (1999, p. 682) suggest that ‘it is generally believed that defects are caused by lack of knowledge, lack of information or lack of motivation’ and that in order to perform rational defect prevention it is essential to possess knowledge about the defects, their causes and associated costs (Josephson & Hammarlund 1999). In terms of the identification of defects, Josephson and Hammarlund (1999) claim that stakeholders who possess limited amounts of experience in construction, are more than likely to be successful in the identification of defects as the more experienced stakeholders perceive some situations as being normal and for that reason fail to record them as defects.

2.8.2 Information Management and Sharing within the Construction Industry

In all sorts of projects, including construction, the way people categorise documents and manage their information is highly personalised. This is most often linked to their experiences and the specific domain knowledge that they possess. The combination of these two factors influences the way they make use of information and, as previous studies have demonstrated, this changes over time as well as from project-to-project (Peansupap & Walker 2006; Arnorsson 2012; Ilozor & Kelly 2012).

According to studies conducted by Rezgui (2001), Björk (2002) and Froese (2010), the construction industry requires a deeper understanding of their current information management and sharing practices. More specifically, the tools needed to assist them with the successful completion of construction projects that are able to meet all the requirements of the agreed project specifications. Studies by Al-Sudairi (2007), Chen et al. (2008), Hwang et al. (2009), Xie et al. (2011) and Al
Nahyan et al. (2012), have all attempted to address these issues, however these studies have focused more upon the exploration of information management and sharing practices with the different stages of a construction project. To date, there has been no reported studies that have dealt directly with the defects inspection process from the perspective of information management and sharing through the use of an information audit.

Apart from the exploration of information management within the different stages of a construction project, Craig and Sommerville (2006) conducted an in-depth study on the construction industry’s approach to information management. The study focused upon the examination of three separate construction projects whereby it reviewed the operation of an information management system. The data was collated over a period of four years where document statistics were analysed to demonstrate the level of activity within both the construction project and the members of the construction team. The findings from this study suggested that major construction projects generated, processed and stored considerable amounts of real-time information prior to, during and post on-site construction. It also revealed that the construction activities were filled with information and that the management of project-related information required an appropriate system that facilitated bi-directional data input, information processing, dissemination and functional access (ease of access to the data required) (Craig & Sommerville 2006). However, as comprehensive as the study was, the findings did not account for the informal interactions that happened amongst the stakeholders, nor did it account for the data/information that was not formally entered into the information management system. Having this in mind, the reporting of these findings could have missed out upon much of the rich information that was available to them.

In recent times, there has been much interest in the use of mobile technologies to aid with the management and communication (sharing) of information on construction sites (Rebolj & Menzel 2001; Kimoto et al. 2005; Chen & Kamara 2008, 2011). Studies conducted by Chen and Kamara (2008, 2011) highlighted the importance of developing a framework for implementing mobile technologies on construction sites. In developing the framework, Chen and Kamara (2011) identified two important aspects: the application model and the technological
model. The application model considered a wide range of factors that might affect the implementation of mobile computing on construction sites, which included: the features of mobile computing, construction personnel, construction information and the construction site itself, whereas the technological model provided designers with clear structure for designing computing systems from a technical perspective. In testing their framework, Chen and Kamara (2011) made use of a real-life construction case study and concluded that through the use of their framework, construction workers were able to select a mobile computing strategy that assisted them in the management of their information. However, similar to the EIM Triangle as discussed in Section 2.4, this framework can be considered to be in its infancy stage as it has only been tested and reported in a single case study. Further research will need to be conducted into the effectiveness of this framework as construction projects including their personnel can vary greatly between two projects (see Section 2.7).

2.9 The Conceptual Framework

The analysis and review of the extant literature in this chapter has highlighted a set of themes related to understanding the roles of information management and sharing in one sector of the construction process. What is evident in this discussion is that these themes influence that process in a variety of ways. It is therefore useful to bring that analysis together in a proposed format of a conceptual framework to enable the case study data in this research to be framed in a way that enables the researcher to makes sense of that data.

According to Shields and Rangarajan (2013) a conceptual framework is an analytical tool that can be used to make conceptual distinctions and ‘organise ideas to achieve a research project’s purpose’ (Shields & Rangarajan 2013, p. 28). It is particularly useful when applied within empirical research or at the micro or individual study level and can be seen as abstract representations that are tied directly to the collection and analysis of data (Shields & Tajallli 2006; Shields & Rangarajan 2013).

From the critical examination of the literature from Chapter 2.1 to 2.8, and consideration given to the research questions, a conceptual framework (see Figure
2-2) is established to provide an evaluative lens to make sense of the data collected in this study.

**Figure 2-2: The conceptual framework**

The central focus of this study is to explore the information management and sharing practices within the construction industry (with a particular emphasis on the defects inspection process) - represented by the grey circle. In doing so, four major inter-related concepts (represented by the grey boxes) are identified in the extant literature as informing the way information is managed and shared in construction. These concepts have been shown in that review of the literature to be iterative and both inform and are informed by the personal ways individuals manage and share information and the collective ways enterprises manage and share information. In order to gain a better understanding of how these four major concepts were derived, Figure 2-2 was expanded to include the influencing theoretical concepts and studies as examined throughout this chapter (see Figure 2-3).
Figure 2-3: The conceptual framework (including the major theories and studies)
3 Research Methodology

3.1 Introduction

This chapter outlines the methodological approach undertaken in this study and provides justification for the research methods used. The chapter explains and describes the context in which the study was situated and conducted. As the focus of this research was a single case study whereby the information management and sharing practices of the stakeholders involved in the defects inspection process of a complex construction project were investigated, an information management technique needed to be applied. This was achieved by means of an information audit. The data collected was undertaken in such a manner as to cause the least interruption possible to the normal circumstances in which the stakeholders routinely operated as suggested by Creswell (2013) and Merriam (1998).

3.2 Adoption of Qualitative Research Approach and Perspectives

According to Creswell (2013), the nature of a problem partially determines why a researcher should select a particular methodology. For a study to adopt a quantitative research approach, it is implied that other researchers have previously studied the problem and, as a result, a body of literature already exists, the variables are already known, and that theories are already developed. Whereas a qualitative research approach is exploratory in nature, the variables are not yet known; context is important and there may be a lack in theory. The aims of both approaches are also different. The qualitative research approach aims to answer questions in relation to what is happening in a particular situation. It describes in detail what is happening in a community or conversation by including the meaning of the message, feelings and effects (Bouma & Ling 2004).

In qualitative research, what people say is captured and interpreted to understand the participant’s perspective on a particular event or phenomenon (Burns 2000). The selection of a qualitative approach is appropriate when it is used to answer questions about the nature of a phenomenon, with the purpose of attempting to describe this phenomenon from a participant’s point of view (Orlikowski & Baroudi...
1991, Leedy & Ormond 2013). Ongoing interaction with participants was required to enable data collection to support the findings that, in turn, provided more opportunities for the researcher to learn from the subjects or participants. Therefore, a qualitative research approach requires the researcher to be more interactive with the participants than in quantitative research (Bouma & Ling 2004).

A qualitative research approach was adopted for this study as it involved the notion that the researcher was interested in meaning; how the stakeholders make sense of their lives, their experiences and structures of the world. Creswell (2013) suggests that in other types of research approaches, data is collected and analysed through inventories, questionnaires or machines rather than through the use of a human. The qualitative research approach assumes that the qualitative researcher is used as the primary instrument in the collection and analysis of data. By description, qualitative research is an approach in which the researcher is interested in the process, meaning and understanding obtained through the use of words or pictures (Leedy & Ormrod 2013). Further justification for the selection of the qualitative approached is highlighted by Patton (2001, p. 40) who states that the design strategies of qualitative research involve:

- **a) Naturalistic inquiry** – studying real-work situations as they unfold naturally; non-manipulative and non-controlling; openness to whatever emerges (lack of predetermined constraints on findings).
- **b) Emergent design flexibility** – openness to adapting enquiry as understanding deepens and/or situations to change; the researcher avoids getting locked into rigid designs that eliminate responsiveness and pursues new paths of discovery as they emerge.
- **c) Purposeful sampling** – case studies (e.g., people, organisations, communities, cultures, events, critical incidences) are selected because they are “information rich” and illuminative, that is, they offer useful manifestations of the phenomenon of interest; sampling, then is aimed at insight about the phenomenon, not empirical generalisation from a sample to a population.
The qualitative approach was applied here through the adoption of a single-case study in which the stakeholders involved in the defects inspection process for a complex construction project were studied; more specifically, in terms of their information sharing and management practices.

### 3.2.1 Interpretative Perspective

Orlikowski and Baroudi (1991) suggest that, just because a study is qualitative, it does not mean that an interpretative perspective is automatically adopted. Klien and Myers (1999, p. 69) explicitly stated that ‘no clear distinction is made between “qualitative” and “interpretive” research’ and that the perspective of the research depends on the underlying philosophical assumptions of the researcher. Chua (1986) suggested that there were three categories in which a researcher’s perspective is based: positivist, interpretative and critical. Within a positivist perspective, the researcher would generally assume that reality is objectively given and can be described by measureable properties, which are independent of the researcher and their chosen instruments and generally attempt to increase the predictive understanding of phenomena (Chua 1986). In light of what a positivist perspective encompasses, it was therefore not chosen as the approach undertaken here as it is deemed to be an inappropriate approach to interpret how the defects inspection process occurs within a complex construction project.

The second of Chua’s (1986) categories in which a researcher’s perspective is based, involves adopting a critical approach. This approach assumes that social reality is historically constituted and that is produced and reproduced by people. It acknowledges that people can consciously act to change their social and economic circumstances. However, critical researchers recognise that the ability to do so is constrained by various forms of social, cultural and political domination (Chua 1986). Orlikowski and Baroudi (1991), suggest that a critical research perspective focuses on opposition, conflict and contradiction in contemporary society, seeking to eliminate the causes of these inconsistencies. It also ‘requires the researcher to attend not only to the matter of mutual understanding, but also the matter of emancipation of organisational actors from false or unwarranted beliefs, assumptions and constraints’ (Ngwenyama & Lee 1997, p. 153-154). Once again,
in light of what a critical perspective encompasses, it therefore was not deemed an appropriate approach for the research undertaken.

The last of the three categories in which a researcher’s perspective is based, as stated by Chua (1986), involves the adoption of the interpretive research approach. Walsham (1995a) suggests that this approach focuses on the complexity of human sense making as the situation emerges and that it attempts to understand the meanings people assign to them. Myers (1997) argues that interpretivism assumes that knowledge is socially constructed through culture, language, consciousness, and shared meaning. It enables research to extend beyond the fact that people communicate and enable further examination of this communication. An interpretive approach lends itself to an understanding of phenomena through the meanings that people assign them and encompasses the range of interpretations and reflections required to address the complexity of the issues. Walsham (1995b) states that it is ‘desirable in interpretive studies to preserve a considerable degree of openness to the field data and a willingness to modify initial theories and assumptions’ (Walsham 1995b, p. 76).

Having taken into consideration the nature of the study, the research questions posed, and the other research approaches, an interpretive research approach was adopted for this study. It was believed that the adoption of an interpretive approach allow the researcher to make sense of the meaning-making practices of the stakeholders as they complete the defects inspection process for a complex construction project. The approach facilitated the study to be conducted from an experience-near perspective in which the researcher did not start with concepts determined a priori, but rather, seek to allow these to emerge from encounters in ‘the field’ (University of Utah, 2013).

3.2.2 Case Study Research

According to Benbasat et al. (1987, p. 370) and Thomas (2011), case study research involves the examination of ‘phenomenon in its natural setting, employing multiple methods of data collection to gather information from one or a few entities.’ Yin (2009) and 2014) further added to the use of the case study method by suggesting that it is an appropriate study when the researcher tries to answer the ‘how?’ and
‘why?’ questions; when the researcher has little control over the events being observed, and when the object is a contemporary phenomenon within some real life context. The works by Yin could be seen as taking on a positivist epistemology (Benbasat et al. 1987; Yin 2009, 2014), however, Myers (1997) through citing other research, claimed that ‘case study research can be positivist, interpretive, or critical, depending upon the underlying philosophical assumptions of the researcher’.

The work by Walshaw (1993, 1995) and Christie (2000) had highlighted an interpretive in-depth use of case study research. Yin (2014, p. 13) claimed that the case study method was ‘an empirical study that investigates a contemporary phenomenon within its real-life context, especially when boundaries between phenomenon and context are not clearly evident’. In summary, the case study requires boundaries to limit the scope of the research, otherwise the case may encroach on other phenomena and cannot create the distinct identity in which the researcher was attempting to investigate. The case study needs boundaries that are sufficiently clear and obvious to assist the researcher to see what is included and what is excluded from the case (Denscombe 1998; Thomas 2011).

Yin (2014, p. 13) argued that the use of case study inquiry ‘copes with the technically distinctive situation where there will be many more variables of interest than data points, and as one result relies on multiple sources of evidence, with data needing to converge in a triangulating fashion, and as another result benefit from the prior development of theoretical positions to guide data collection and analysis’. Although it is acknowledged that Yin’s approach is positivist, through the nature of the variables, the notion of the multiple sources of data collected increases the validity and reliability of any particular study. However, the advantage of adopting a case study approach is that there is no specific data collection or analysis method, rather a variety of methods could be used in conjunction to provide triangulation and rigour to the research. This makes the case study approach a comprehensive research strategy (Stake 1994; Yin, 2009, 2014).

According to Denscombe (1998) and Thomas (2011), the use of data from different sources could be cross-examined to demonstrate the consistency of the findings to support the analysis. Data for this study was collected via a range of methods which
included: observations, document collection and interviews (see Section 3.6). Work by Benbasat et al. (1987, p. 381) argued that case study research is well suited to the field of Information Systems not only because ‘the researcher can study information systems in a natural setting, learn about state of the art, and generate theories from practice’, but also ‘to understand the nature and complexity of the processes taking place’. Although the researcher does acknowledge that the work is dated, it does demonstrate the usefulness, significance and acceptance of the case study method for performing research. These principles and understandings can also be applied to the information management discipline and, more specifically, this study. The study involved the observation of participants in their natural setting whilst implementing state of the art defecting technologies (Inspection and Defects Management System (IDMS)). It also made sense of the complexity and nature of the process taking place through the lens of an information audit.

Although there are many advantages associated in the adoption of case studies as a research method, there are also many criticisms. Case studies typically make use of only a few examples to represent a wider range of examples being investigated, and the credibility of these generalisations are often criticised (Denscombe 1998 and Yin 2014). Further arguments suggest that case studies should not be limited to just one case, instead generalised to similar cases because there are the same ‘generative forces’ influencing the social relationships. However, Stake (2000) and Lincoln and Guba (1985, p. 111) argue that the term ‘generalisation’ was extreme, claiming that ‘when a generalisation had been devised, no participant of that class, kind, or order can escape its pervasive influence’. Stake (2000, p. 439) further argues this point by noting that ‘generalisation should not be emphasised in all research’ and that is difficult to define boundaries to limit the scope of the case. Denscombe (1998), Thomas (2011) and Benbasat et al. (1987) state that if the definitions of the boundaries are not clear enough, the case becomes easily influenced by other factors outside the scope. Conversely, if the boundaries are made too inflexible, the case then becomes impervious to reflect the boundaries. Having taken this into consideration, Stake (2000) therefore recommends that the researcher should decide which factors should be included in the research and which should be ignored; otherwise it would be difficult to state what the case was.
Stake (1995, p. xi) defined a case study as the ‘analysis of the complexity of a single case’. Stake (1995, p. 8) continues to argue that the ‘great benefit of a case study was its capacity to penetrate into the particular details of a situation and how things actually happen’. This notion more than compensates for whatever criticisms might be made about the difficulties of generalising from a case study to a universal statement.

3.2.2.1 Single Case Study

Christie et al. (2000, p. 15) suggests that the use of single case study research is applicable when the case is: ‘critical or unique or when the researcher is able to access a previously remote phenomenon’. Studies conducted by McKinney (1966), Smith (1988) and Yin (2014) also suggest that this method is valid for studies that are pilot or exploratory in nature, as well as shown to be representative of a large population. Flyvbjerg (2004) claims that one of the most common misunderstandings about the use of a single case is that it cannot be easily generalised which can be seen as detrimental to the scientific method. In citing Giddens (1984) work, Flyvbjerg (2004, p. 423) argues that through the use of a single case it is ‘incorrect to conclude that one cannot generalise from a single case. It depends on the case one is speaking of, and how it is chosen’. Within the context of this study, the researcher was able to access a previously remote phenomenon in which he was provided with the opportunity to observe a team of stakeholders as they completed the defects inspections for a complex construction project. The case was also seen as unique as the parties involved implemented a new process not previously adopted beforehand (see Chapter 4.2.8).

According to Eisenhardt (1989 p. 540) and Thomas (2011) ‘the adoption of a single case study does have limitations’ and both recommend the use of multiple case studies as their use is able to produce high quality cross-comparisons. Eisenhardt (1989) advises that the tactics are driven by the reality that people are notoriously poor processors of information. People would then jump to conclusions based on their limited data, and would be overtly influenced by the vividness (Nisbett & Ross, 1980, Thomas 2011). Yin (2014) also commented that multiple case studies could, to some degree, rectify some of the limitations associated with the use of
single case studies. However, Creswell (2013) suggests that these limitations can be overcome by collecting a wide range of data about an individual case which involves a greater interaction with the participants. It is through this wider collection, that deep analysis is possible through the examination of the interactions between the variables that affect human decision-making. For the duration of the study, the researcher had ongoing interaction with the participants and was able to collect data through a wide range of sources to support the findings.

3.2.2.2 Information Audit Methodologies

Chapter 2.6 provided the literature surrounding information audits. The following section will provide an examination of the different types of information audit methodologies available and provide justifications to why Henczel’s (2001) seven-stage auditing process was selected.

Buchanan and Gibb (2007, p. 159) describe the information audit as being, ‘central to the effective organisational management of information, however there is evidence from the field that information audit is neither fully accepted nor commonly practised’. When an information audit is executed by an information practitioner it can be seen as a very costly exercise for an organisation due to the time and resources that must be allocated for such an undertaking.

Currently, there are no standards or agreed methodological approaches within the field, and it is generally left to the practitioner to sort through a myriad of academic and proprietary methods – some more comprehensive than others (see Table 3.1). Once an appropriate methodology has been selected, the practitioner is required to identify ‘the numerous tools and technique(s) required to support the methodological process’ (Buchanan & Gibb 2007, p. 161).

Many may also argue that a standard for information audit is not required, as each organisation needs to be treated as a separate entity and requires a different approach. Buchanan and Gibb (2007, p. 161) also suggest that there is a, ‘lack of an agreed methodological approach’ which, in turn, makes the selection of the methodology somewhat challenging. To add to the complexity of methodology selection, there has also been limited empirical evidence regarding the usability of the existing approaches.
In support of Buchanan and Gibb's (2007) argument, Botha and Boon (2003, p. 36) research concluded that, ‘more research is required on the topic of information and more of the methodologies need to be tested in practice’ which in turn will allow both practitioners and academics to develop more reliable information audit methodologies that can be confidently used and re-used.

<table>
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<tr>
<th>Year(s)</th>
<th>Author</th>
<th>Brief description</th>
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<tbody>
<tr>
<td>1987</td>
<td>Worlock</td>
<td>Worlock discusses a framework of headings for the auditing process after testing it out in various environments and suggests that the judgement of these headings rests with the person undertaking the audit. In total, there are five headings, each of which should not be seen as being mutually exclusive. The five headings are: Utility analysis. Quality values. Productivity factors. Implementation criteria. Strategic impact statements.</td>
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<td>1988</td>
<td>Burk and Horton</td>
<td>Burk and Horton were the first to develop InfoMap; it was seen as the first information audit methodology developed for widespread use in the industry. Its focus was to evaluate the information resources using a four-stage process: Survey staff using questionnaires or surveys. Measure the information resources against cost/value. Analyse resources. Synthesise the findings and map the strengths and weaknesses of the information resources against the objectives of the organisation.</td>
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<td>Year(s)</td>
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<td>1993</td>
<td>Booth and Haines</td>
<td>Booth and Haines made use of the information audit for organisational change and for the development of a new information policy for a regional health authority in the UK. Their strategy involved five components, which were: Identify and review the corporate objective. Decide what information is needed to meet the corporate requirements. Conduct an information audit through the use of questionnaires and interviews to determine if the current required information exists within the organisation and if so, how it is currently being utilised. Address the identified information gaps and problems where possible. Develop a comprehensive information management policy for the organisation.</td>
</tr>
<tr>
<td>1993</td>
<td>Ellis, Barker, Potter and Pridegeon</td>
<td>Ellis, Barker, Potter and Pridegeon acknowledge that there are many different approaches to information auditing; however, they suggest that, to fulfil its function, an information audit must encompass the following: Establish what the major goals of the organisation/operation are and what kind of organizational constraints act upon the operational information systems. Determine the needs of the users. Inventory the resources available. Build up a coherent picture of how the system functions from the information gathered in the first three stages.</td>
</tr>
<tr>
<td>1994</td>
<td>Webb (cited in Botha &amp; Boon 2003)</td>
<td>Webb describes the information audit according to three distinct stages: Initial audit (inventory). Collecting the data. Data analysis. It can be seen as an operational advisory audit as it looks at how the information audit can be used to audit the current system and how effectively and efficiently the resources are being used.</td>
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<td>Year(s)</td>
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<td>Brief description</td>
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<tr>
<td>1997</td>
<td>St. Clair</td>
<td>St. Clair states that the information audit can be grouped into five main areas which are: 1. Getting the ball rolling 2. Conducting interviews 3. Organising and conducting interviews 4. Follow up 5. Typical pitfalls and mistakes.</td>
</tr>
<tr>
<td>1998</td>
<td>Buchanan and Gibb</td>
<td>Buchanan and Gibb studied a number of IA case studies and developed what they described as a “universal model” for conducting IAs. Their approach was to create an IA model that could be used in a number of different environments and for the purposes of developing an effective information strategy for organisations. The “universal model” proposed by Buchanan and Gibb consists of five phases, these being: 1. Promote 2. Identify 3. Analyse 4. Account 5. Synthesise.</td>
</tr>
<tr>
<td>2001</td>
<td>Henczel</td>
<td>Henczel's work in 2001 leveraged off the strengths of Orna and Buchanan and Gibb to produce a seven-stage auditing process. Henczel also suggests that the use of the information audit should focus more on the strategic direction of the organisation and that it is the first step in the development of a knowledge audit or knowledge management strategy. Henczel's seven stages are: 1. Planning 2. Data collection 3. Data analysis 4. Data evaluation 5. Communicating recommendations 6. Implementing recommendations 7. The information audit as a continuum.</td>
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Information Management and Sharing Practices within a Construction Project Process

Chapter Three: Research Methodology

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<tr>
<th>Year(s)</th>
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<th>Brief description</th>
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<tr>
<td>1990</td>
<td>Orna</td>
<td>Orna makes a metaphorical reference to the financial audit in her description of the Information as an, ‘authoritative examination of accounts with verification by reference to witnesses and documents’ (Orna, 1990, p. 9). Orna discusses the scope of the information audit in terms of seven phases which are: 1. Plan. 2. Investigate the information available in the organisation. 3. Identify the resources that are available for making information accessible. 4. Determine information used to further the purposes of the organisation. 5. Identify those that are responsible for managing and processing the information, respectively. 6. Identify and evaluate the information technology that is used to manage information resources. 7. Calculate the cost and determine the value of organisational information resources. Since then, Orna (1999) has developed an alternative auditing process comprising ten steps: 1. Conduct a preliminary review to confirm operational/strategic direction 2. Gain support/resources from management 3. Gain commitment from the other stakeholders (staff) 4. Plan, including the project, team, tools and techniques 5. Identify the IR, information flow and produce a cost/value assessment 6. Interpret findings based upon current versus desired state 7. Produce a report to present findings 8. Implement recommendations 9. Monitor effects of change 10. Repeat the information audit.</td>
</tr>
<tr>
<td>1999</td>
<td></td>
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<tr>
<td>2004</td>
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Table 3-1: Outline of the major information audit methodologies over the past three decades

From the examination of the major information audit methodologies over the past three decades (Table 3.1), it is apparent that there are many different approaches to conducting an information audit with Buchanan and Gibb’s (1998, 2007 and 2008) and Orna (1990, 1999 and 2004) being revised multiple times. It is also of interest
to note that not all of the information audit methodologies focus on the same aspects and contain the same level of structure and detail. For example: Webb’s (1999) approach involves three distinct stages which can be seen more as an operational advisory audit, whereas Henczel’s (2001a) seven-stage auditing process auditing which builds on the strengths of both Orna’s (1999) ten-stage information auditing process and Buchanan and Gibb’s (1998) “universal model” could be seen as more comprehensive allowing the user to focus on a number of different aspects. These included: the strategic direction of an organisation, the identification of what information was being supplied including any gaps, inconsistencies, bottlenecks and duplications, the information required to meet the needs of both the organisation and process, and the ability to map both the internal and external flow of the organisation’s information. It is for that reason Henczel’s (2001a) seven-stage auditing process was selected as the guiding methodology for this study.

3.3 Research Population and Sample

During the defects inspection stage of a construction project, there are often many stakeholders involved. These include: architects, builders, trades people, engineers and project managers. The information required by each stakeholder would vary in terms of the role they held as well as the tasks they needed to complete.

As this particular study primarily focused on the defects inspection process, not all the stakeholders listed above were investigated. Therefore criteria were established in order to select the most appropriate participants. Participants in the study had to be directly involved in the defects inspection process, a process in which stakeholders visually inspect the building for both design and construction defects as opposed to the defects rectifications, which involve the physical rectification of items. Consequently, trades people and engineers were excluded from this study.

After applying the criteria, the study identified six stakeholders who ultimately formed the defects inspection team. The team comprised three architects: principal, site and documentation, two builders: site manager and graduate and one project manager. Although there were six stakeholders identified, during the on-site defects inspections, there would generally only be a core team of three or four present depending on their availability. The project manager and the principal architect,
although part of the team, were often not present and, if so, were present only to solve any major issues that had arisen. They were often engaged in other aspects of the construction project and left the defects inspections soon after the issues were resolved.

3.3.1 Stakeholder Profiles

To gain a greater understanding of the stakeholders in the defects inspection process, the following section will profile the core team of stakeholders in terms of their demographic information, current and previous roles and the experience they bring to this process. All stakeholders involved in this study have been provided with an alias in order to comply with the ethics approval and to maintain their anonymity.

3.3.1.1 Colin

Colin is a very experienced ‘site architect’ with more than 30 years’ experience in the construction industry. Colin has been working with his current architectural practice for the past ten years and, in that time, has inspected numerous buildings. Prior to this role, he worked for another architectural firm that was responsible for the design and defects inspections of other educational buildings that this particular University owned. His primary role on this construction project was to be onsite during the defects inspection process and work through all the defects with the builders. He also needed to make sure that the information from the drawings and other architects were relayed correctly back to the builders and that the finished product met the architectural specifications.

3.3.1.2 George

George could be classified as a ‘documentation architect’ with more than ten years of experience in the construction industry. He has been working with the architectural practice involved in the project for the past five years, and during that time, has focused on the documentation of specifications for various buildings. George was trained in Europe and his previous role was with a large architectural practice in Sydney. During this construction project, George was required to assume Colin’s role for six weeks whilst Colin was overseas on leave. Upon Colin’s return,
George continued to work in tandem with Colin and the builders until the defects inspection stage was complete.

3.3.1.3 Alan

Alan is an experienced site manager with more than ten years’ experience within the construction industry. He has worked for only one construction company since graduating from his construction management degree. Alan specialises in the inspection and handover stages of a construction project and has inspected over 240,000 square metres of office space, however this project was his first educational building. Alan’s primary role on this project was to lead the defects inspection team and to get the building ready for handover.

3.3.1.4 Lisa

Lisa is in her mid-twenties. She has recently joined the construction company via a graduate entry program and is being rotated through different facets of the construction process. She holds a degree in architecture as well as a Masters in Building and Construction. Her role as a junior coordinator on this project was solely to work on the defects inspections, which involved the inspection and recording of all the defects identified and forwarding these lists to the contractors for rectification.

3.4 Recruitment of Participants

Upon commencement of the study in March 2008, a senior academic referred the researcher to a project involving the construction of a purpose-built innovative academic building. This provided the catalyst for the researcher to make contact with the director of the architectural practice in relation to their potential for participation in the study.

A face-to-face meeting with the director was arranged soon afterwards in order for the researcher to elaborate on the scope and identify the practice’s suitability for the study. At the conclusion of the meeting, verbal agreement was obtained, pending ethics approval from RMIT University.
After receiving ethics approval from RMIT University in December 2008, a formal approach was made to the director of the architectural practice requesting permission for the researcher to observe and interview the architects working on the defect inspection stages of the construction project. Upon receipt of official confirmation for participation in the study, the director was sent the consent forms and cover letters, which also served as the Plain Language Statement (PLS).

It was then left up to the director of the architectural practice to identify and select the most appropriate architects for participation in the study. Two architects were identified as matching the criteria. Once again, potential participants were invited to a face-to-face meeting in order for the researcher to outline the study to be undertaken, and provide them with the consent forms and cover letters. Potential participants were then able to take the documentation away to decide if they wished to participate in the study, signalling their interest in participation by signing and returning the consent forms to the principal researcher.

The next stage in the recruitment process involved the participating architects making formal introductions to the rest of the defects inspection team. Once again, the same process was adhered to where face-to-face meetings were arranged and potential participants provided with the consent forms and PLS. In total another three participants were identified which included a project manager and two builders.

3.5 Data Collection Procedures

The data collection procedure in this study made use of the case study approach, which encourages the use of multiple methods. This approach increased the rigour and creditability, offering triangulation amongst the data collected. The data collected for this study was done through the following means:

*Interviews:*

The researcher used open-ended questions throughout the research visits with the 4 key participants. ‘Open-response questions to obtain data of members meanings – how individuals conceive their world and how they explain and “make sense” of the important events in their lives’ (McMillan & Schumacher 2001, p. 443).
Document Collection:

Involved the collection of documents including letters, personnel files, memos, annual reports, images and objects such as posters to supplement the other information collection methods.

Observations:

Involved the observation of stakeholders in the defects inspection process within their natural setting and completing their allocated tasks. During these sessions two experienced researchers were also invited to participate in order to validate the primary investigator’s observations. This was particularly important as one possessed specific domain knowledge in information management, whilst the other in construction.

Data for this study was collected via a variety of methods and locations (see Figure 3-1).
Figure 3-1: Data collection process
Primary data was collected on-site over an intense fourteen-week period in which thirty-six observation sessions were conducted, each lasting from one-and-a-half to two hours. According to Daft and Lengel (1986, p. 560) the selection of this method provided the researcher the ‘richest medium because it provided immediate feedback so that interpretation could be checked. It also provided multiple cues via body language and tone of voice’. During these sessions, observation notes and images were taken through the use of the researcher’s iPad and personal notebook. The notes then would be taken back to the researcher’s office and transferred onto a standardised template (see Appendix A) which included the time, date, location, duration, participants, verifiers and specific notes. These notes would then be used as the basis for the comparison and validation against that of the other researcher present. Images captured were transferred onto the researcher’s computer for storage and reference later on. The onsite observations also included a novel approach in which two experienced researchers were invited to attend. This was particularly important as one possessed specific domain knowledge in construction whilst the other in information management. Their primary role in the study was to observe the defects inspection process and record their own notes. These notes were then compared to that of the principal researcher in order to validate and contextualise what had just been observed.
The study also made use of formal and informal interviews. Informal interviews happened on-site during the observation sessions. Questions would be asked of the stakeholders as certain situations would arise in which the researcher required further validation or clarification. Typical questions that were asked included:

a) What do you mean by that term?

b) Is this typically how it would be done on other projects?

c) What happens to this list after you return back to the office?
The researcher would then note down both the question posed and the stakeholders’ responses in their notebook for reference later on, whereas during the follow-up interviews, with the permission of the participants, an audiotape-recorder was used. At the completion of each interview, a transcription of the interview was produced. Notes were also made during the interviews. These included reflective and demographic information such as time, place and location.

It is inherent in most types of qualitative research that the style of interviewing changed from one interview to the next. Therefore, the researcher made use of what has been referred to as ‘reflection-on-experience’ (Schön 1987: Boud 1993 and Yoong 1999). This process involves ‘the trainee [interviewer] revisiting the experience [the first and subsequent interviews] … The interviewer re-evaluates the experience, makes connections with the prior experience, and plans the according strategy to deal with similar events in the future [in this case, planning and modifying the interview questions in order to achieve the appropriate answer to the research questions posed earlier on. It could also assist with the identification of further issues that have arisen as a result of conducting previous interviews’]’ (Yoong 1999, p. 94).

In light of this, the interview questions were modified slightly for each interview. This method was adopted as it allowed the researcher to probe further issues identified in the interviews conducted with the stakeholders involved in the defects inspection process. However, most of the interviews were in the form of, and made use of derivatives of the following questions:

a) In your own words can you please describe the defects inspection process?
b) How do you manage your information during the defects inspection process?
c) Do you think that managing and sharing of information assisted you in defecting the building?
d) Were there any differences in the way you managed your information in comparison to that of others involved in this process?
e) Were there any differences in the way you managed your information to that of how your organisation managed it?
f) Do you think experience counts whilst conducting defects inspections?
g) Did the tacit knowledge that you already possess assist you in defecting the building quicker?

h) How important is the documentation and how often did you refer back to them?

The questions listed above changed to reflect the observations made of the defects inspection team. The final interview schedule is attached in Appendix B.

Each interview lasted for a period of sixty to ninety minutes. Once the interviews were conducted, the transcript of the interview was sent to the interviewee for verification. This provided the participants with the opportunity to correct any detail that was taken out of context. Minor changes were made to some of the questions, particularly to obtain more information or focus on a particular event. Questions were also modified for each of the participants according to their role and responsibilities within the defects inspection process. For example, there would be no point in asking the builders questions in relation to how the architectural practice managed their information, therefore questions pertinent to the defects inspection process were asked.

Data was also collected through the form of documents, which included participants’ hand written notes, defect list printouts, and screenshots of the IDMS system. Yin (2009) suggests that there are many benefits in relation to the collection of documents as the information contained in these documents are:

*Stable, and can be reviewed repeatedly; unobtrusive, as they are not created by the members of the organisation for the purpose of the research; exact, the information contains exact names, references and details of events; broad coverage, spanning a long period of time; and able to corroborate and augment details given in interviews (Yin 2009, p. 80).*

Through the collection of the documents, it was anticipated that the researcher would be assisted in obtaining information in relation to the defects inspection process. It was also a key component of an information audit, in which Orna (1999, p. 69) defines an information audit as ‘a systematic evaluation of information use, resources and flows, with verification by both reference to both people and existing documents, in order to establish the extent to which they are contributing to an
organisation’s objectives’. The acquisition of these documents assisted the researcher to validate and verify what had been stated by the stakeholders involved in the defects inspection process. This, in turn, creates a richer picture of the defects inspection team and how they operated during the defects inspection process.

3.6 Data Analysis

According to Stake (1995) and Creswell (2013), the reporting approach that a researcher adopts when using case study research should be significant enough so that the data may be adequately analysed and published. The following section will outline the implementation of the data analysis tools and techniques used within this study. The hermeneutics cycle, in conjunction with the usage of QSR International’s NVivo 10 – a computer-aided qualitative analysis software application was adopted.

3.6.1 Hermeneutics

Walsham (1993, p. 9) suggests ‘hermeneutics can be thought of as a key strand of phenomenology since the interpretation of text is an important part of the search of meaning and the essence of experience’.

The study made use of a reiterative analytical technique of taking the literature review, in conjunction with a conceptual framework and the ideological preconceptions of the researcher and then applying it to the data collected. Judgements were made on the data and references were made to the literature to substantiate the researcher’s personal judgement. The use of such a technique is termed ‘hermeneutics’, where the primary focus is the meaning of text.

Drawing upon the work of Gadamer (1976), Myers (1997) and Klein and Myers (1999), claimed that the hermeneutic cycle assisted in the understanding of the text as a whole and the interpretation as its part whereby descriptions are guided by anticipated explanations. Text is interpreted based on iterations of the researcher’s own experiences, existing literature and research. These interpretations are then to be used to make judgements about text, creating further reiterations and interpretations of that text until conclusions or theorising suggest further
reinterpretations. Figure 3-3 demonstrates the use of the hermeneutic circle and the impact of the researcher on the analysis of data within this study.

Figure 3-3: The Hermeneutic Circle (adapted from Thanasankit 1999)

The cycle demonstrates that text is interpreted based on the interactions of the researcher’s own experience and draws from the existing literature. From there, the interpretations are used to make judgements about the text or data, thus creating further cycles of iterations and interpretations of the text until conclusions or theorising suggest further reinterpretations (Thanasankit 1999).

3.6.2 Qualitative Research Tool

In order to assist with the handling of the vast amounts of rich data gathered from the interviews conducted, a computer aided software application was utilised. NVivo, which is a tool developed and provided by QSR International, was adopted. According to the QSR International website (2013), NVivo is a tool that can be used by anyone who wants to examine or make sense of information. It is designed for use by researchers, academics, forensic scientists, psychologists, tourism managers, sociologists, consultants and students from around the world.

Through the use of NVivo, the application is able to assist the researcher in the analytical process of a qualitative analysis method, due to its capacity to: store, sort, match and link data. It can also provide invaluable assistance to the researcher in answering the research questions from the data without losing access to the source...
data. Bazeley and Jackson (2013) suggest that NVivo is able to support the analysis of qualitative data by:

- Managing data
- Managing ideas
- Querying data
- Graphically modelling
- Reporting from the data.

The use of NVivo does not ensure rigour in qualitative research. The Hermeneutic Cycle described in this chapter was a key part of maintaining rigour and validity in the analysis of the data; whereas NVivo provided the researcher with further opportunities to engage with the data in a more organised and systematic nature. The efficiency obtained through the use of such a tool enabled better analysis to be performed, which, in turn, provided flexibility when the analysis required re-coding or re-examination. Engagement with the data improved the researcher’s understanding of the emerging concepts.

The literature has revealed mixed responses in terms of the usefulness of using such a tool as NVivo for the analysis of qualitative data as opposed to doing it manually (Bringer et al. 2004, Welsh 2002 and Richards 1999). Its use facilitates the interrogation and analysis of data at a particular level, allowing engagement with the data, and the derivation of impressions and concepts from it. Welsh (2002, p. 7) suggests that: ‘the searching tools in NVivo allow the researcher to interrogate her or his data at a particular level. This can, in turn, improve the rigour of the analysis process by validating (or not) some of the researcher’s own impression of the data’.

Thompson (2002) argues that in the early stages of analysis, a computer-aided tool can help the researcher make sense of the huge amount of data collected and the complexity of analysing it. Through its use, it is able to show patterns in the data identified and how it took shape in the early stages of analysis.

It is important to note that the tool itself does not replace the researcher’s immersion in the data, or reflection and analysis. It simply facilitates the organising and sifting of the data to enable the researcher to perform the inductive analysis, using the research interpretation of the data. The intellectual work of actually conceptualising
the data can only be completed by the researcher. Webb (1999) states that the computer may assist this process, however there is a risk of becoming so concerned with the technical aspects application that this interferes with the ‘artistic’ aspects.

3.6.2.1 NVivo Processes and Procedures

The following section will outline the process and procedures adopted in the analysis of data through the use of QSR International’s NVivo 10.

Upon the completion of the participant interviews as outlined in Section 3.6, the researcher downloaded the audio files onto their computer and proceeded to transcribe the audio. Once each transcription was complete, the researcher sent a copy of the transcript back to the interviewee for verification and any requested adjustments were made. The next stage involved the researcher sifting through each transcript and removing all the identifiable personal and organisational data as prescribed by the ethics approval (see Section 3.9). Each transcript, along with the researcher’s observation notes were then imported into NVivo as demonstrated by Figure 3-4: Importing of data into NVivo.
Figure 3-4: Importing of data into NVivo
Once all data had been imported into NVivo, a first pass at coding each data source was made. This involved the researcher analysing each line of the imported data sources and allocating them with nodes which best represented the main essence of the text. At the completion of the first pass and as specified in Section 3.7.1, the literature was consulted to see if any concepts or ideas had emerged. This process was repeated a second time when additional nodes were allocated in light of what had emerged from the literature and the experiences the researcher obtained whilst conducting the on-site observations. A third and final pass at coding was made to ensure that the researcher’s interpretations, experiences and literature had been incorporated into the analysis.
Figure 3-5: The coding of the data sources within NVivo
At the completion of the coding process within NVivo, the matrix coding query was applied in order to identify the relationships between the nodes. This process involved the cross-tabulation of the coding intersections between two lists of items. These relationships assisted the researcher in the identification of major concepts and themes which arose due to the undertaking of this study and helped form the basis of the findings. The results from running the matrix coding query were output via an Excel spreadsheet (see Figure 3-6) where important concepts were highlighted. It was then left to the researcher to go back into the data sources and make further interpretations that would ultimately guide the findings.
Figure 3-6: Matrix coding query results as output via Excel
In addition to conducting the matrix coding query, Bazeley and Jackson (2013) suggested that the use of NVivo could assist the analysis of qualitative data by representing the data graphically. Hence, a text-frequency query was executed in which a word cloud map was produced. The application of this query assisted the researcher to gain further insight into the data via a graphical means of qualitative data analysis. The results from this query will be discussed in further detail in Chapters Five through Eight.

3.6.3 Reporting of Data

As stated in Section 3.2, the following study adopted a qualitative approach which focused on a single case study. The study focused on the information management and sharing practices of stakeholders involved in the defects inspection process for a complex construction project. The researcher acknowledges that there is a limit on how far the data from this case study could be extrapolated, however, the researcher does believe the case study chosen is reasonably indicative of the defects inspection process, but not absolutely representative. Consequently the following discussion should be read as primarily reflecting the circumstances in the specific case study being discussed. Nevertheless, with due diligence and care, there is benefit on reflecting more broadly about findings that could be interpreted from this case study. This is to be found in the concluding sections of Chapters Four through Eight, together with the final chapter itself.

The language used in this single case study by the participants is idiosyncratic and only occasionally aligns itself with Information Management terminology and conventions. Reporting verbatim all of the material collected during the interviews and on-site observation sessions would result in a document many times larger than this thesis and is clearly not a practical option. For this reason, a variety of direct quotations and indirect summaries were selected to support the findings.
3.7 Issues of Reliability and Validity

With any type of research, there is always a need to consider the issues of reliability and validity. As the following study has adopted a qualitative research approach, Neuman (2007) suggests that one of the most important considerations for this approach is the need for high quality data. Qualitative data, by its nature is subjective, whereby participants subjectively interpret their own experiences within a social context. It is important to note that the researcher cannot remove the participant’s views to collect quality data, rather the participants’ descriptions are required to enable researchers to immerse themselves in the study to obtain authentic experiences in the social world in which the participants interacted.

Within case study research, there are two main types of validity: external validity and internal validity. Internal validity relates to the questioning of the findings or conclusions correctly mapping to the experience. In other words, does the research get at the substance of the story being told? According to Trochim (2000), internal validity is only relevant to studies which try to establish a causal relationship. It is not relevant in most observational or descriptive studies, but is more suited to studies that assess the effects of social programs or interventions. On the other hand, external validity, questions the degree to which findings are credible and can be generalised to other similar settings in which the study has occurred.

Lincoln and Guba (1985), Kvale (1996) and Neuman (2007) suggest that there are many activities a researcher could utilise to increase the validity within a study. One such activity is prolonged engagement, which involves: the investment of sufficient time to learn the ‘culture’, the testing for misinformation introduced by distortions and to build trust. Within the context of this study, the researcher attempted to familiarise himself with the members of the defects inspection team through various means which included casual catch-up coffee sessions before the on-site inspections. It was during these sessions that the researcher and participants were able to have casual conversations that were not directly related to the study, which, in turn, assisted with the familiarisation process and built trust amongst the parties involved. The researcher also made a conscious effort to make use of terminology that the participants would be familiar with, such as discussing previous
construction projects and particular acronyms. Formal interviews were conducted at a time that was suitable to the participants, and in a familiar environment, typically their offices. This made the participants feel comfortable and encouraged them to discuss their role within the defects inspection process of a complex construction project.

As on-site observations were used the researcher was conscious that “The Hawthorn Effect” (Landsberger 158) may have played a role in the way stakeholders modified their behaviours in response to the researcher being present. To minimise the Hawthorne effect additional time was spent observing the stakeholders. This strategy was used to limit any changes in work place practices cause by the observations.

According to Neuman (2007), a study’s validity can be increased through the use of participant checks – a process whereby the data collected by the researcher is validated against the participants’ understanding of the phenomenon being investigated. This activity ensures that participants are provided with the opportunity to dispute or add truth to the findings derived from the study by the researcher and to challenge what they perceived to be incorrect interpretations. Within the context of this study, two member checks were performed. However, before these checks could be implemented, stakeholders involved in the defects inspection process were approached and were provided with a consent form and the plain language statement. This informed potential participants about the objects of the study and addressed ethical issues. Participants were also asked for their permission to audio record the interviews, which then would be transcribed. Therefore, the first participant check involved the researcher sending a copy of the transcript of their interview as soon as it had been transcribed. This check provided participants the opportunity to change the transcript if desired, including typographical errors and errors by the researcher misinterpreting the recordings of the interview. The second participant check was performed at the completion of Chapter Four. This involved the researcher sending a copy of Chapter Four – The Defects Inspection Process to participants allowing them the opportunity to verify the process, and to provide any further detail that was relevant. Changes resulting from the participant checks were minimal and typically involved the researcher
fixing small typographical errors. These changes did not affect the analysis of the study.

Issues of reliability refer to whether the findings established by the researcher about the members and events are either internally or externally consistent (Kvale 1996 and Neuman 2007). Internal consistency questions if the data provided was plausible, eliminated human deception and ensured that the story being told fits into a coherent picture. Through the observations of the stakeholders involved in the defects inspection process and follow up one-on-one interviews, the researcher believed that an accurate story was provided by all participants as they were all able to provide similar accounts of the defects inspection process. By the time the researcher had interviewed the final participant, the researcher was able to describe and recount the defects inspection process verbatim, due to the consistency provided by the participants involved in this study.

External consistency refers to the ability to cross-check the observations and stories provided by participants interviewed against each other through the use of divergent sources of data (Kvale 1996 and Neuman 2007). Within the context of this study, two approaches were adopted. The first (as described in Section 3.5) involved inviting experienced researchers who possessed specific domain knowledge in either Construction or Information Management to attend the observation sessions. These experienced researchers were asked to observe the stakeholders as they completed the defects inspections and to record what they had just seen. The notes were then compared and validated against that of the researcher in order to ensure that what was being observed was consistent and that the researcher did not miss out on any vital pieces of information related to the specific knowledge domains. Whereas the second approach involved the use of document collection as a method to supplement the information provided by the participants interviewed. Established recognised documents such as defect inspection lists, schedules and drawings were used to verify what had been said by the participants interviewed. This increased the triangulation of the study, ensuring that the information provided by the participants interviewed was accurate and in turn, minimising the effects of misinformation, evasions, lies and fronts (Kvale 1996 and Neuman 2007).
3.8 Ethical Issues

As the study involved collecting documents, observing and interviewing participants, upmost care was taken in order to ensure that the confidentiality of the data collected and maintain anonymity of all involved.

The College of Business Human Research Ethics Committee – RMIT University granted approval for this study on 9th December 2008 (approval number: BCHEAN 746). Subsequently, as the study evolved, changes were made within the research design. Changes included: the participation of stakeholders besides the architects, and the methods by which data was collected. Therefore, an amendment to this application was sought and approved on 12th February 2012.

In order to participate within the study, Plain Language Statements and signed consent forms were required for all participants. Both forms iterated that participation in the study was entirely voluntary and included a clause enabling participants to withdraw their consent at any given stage. As the interviews undertaken were recorded and transcribed, participants were offered the opportunity to view their own copies of the interview transcripts for validation purposes. The interview recordings were downloaded to the researcher’s computer in which a file naming convention was adopted. Each interview recording was labelled using the participant’s alias followed by the date, for example: Colin-280312. During the recorded interviews only given names were used. However, to preserve the confidentiality of the participants, aliases were adopted in the transcripts, this thesis and the publications based on this study. In terms of the documents that were collected as a result of this study, all identifying features such as names and positions were removed.

All data collected during this study will be kept in accordance with RMIT University guidelines. Data will be stored for at least seven years, with one set kept at RMIT University, whilst the other is housed with the researcher. Printed or hardcopy versions of the data including the signed consent forms were kept in locked cabinets whilst electronic copies of stored data require password access known only to the researcher.
3.9 Summary

This chapter described the research method used for examining the research questions. A justification was provided for the use of qualitative interpretative method. Descriptions were provided in relation to how the observation sessions and interviews were designed and conducted. The context of the case study had been discussed along with the methods of data collection and analysis. An explanation, and justification in the selection of an information audit as an information management technique was provided.

A single case study methodology was employed, where multiple methods were implemented. This approach enabled the researcher to observe, collect documents and conduct interviews with the defects inspection team as they completed tasks within their normal operating environment. The use of multiple methods also increased the rigour and credibility of this study. The research approach taken has enabled an understanding of the many factors that contributed to the management and sharing of information amongst the stakeholders involved in the defects inspection process and catered for a rich stream of findings that informed the case study.

Finally, the key findings from the observations and interviews were analysed and reported through the use of NVivo and the Hermeneutic Cycle. The interpretative findings of the information sharing and management practices of the stakeholder involved in the defects inspection process are discussed in Chapters Four through Eight.

The next chapter (Chapter Four) will document and describe the defects inspection process as a result of completing the information audit.
4 The Defects Inspection Process

4.1 Introduction

This chapter presents the findings as a result of completing an information audit during the defects process of the case study project as outlined in Chapters 1 and 3. The discussion draws upon data that was collected from a variety of sources including on-site observation sessions, document collection and interviews (see Chapter 3.5). This chapter provides an understanding of the defects inspection process and how it was conducted within the context of this complex construction project.

4.2 Defects Inspections

The construction process can be seen as being complex in that it incorporates a vast number of processes and sub-processes (see Figure 4-1). It relies on stakeholders (clients, project managers, architects, consulting engineers, builders, contractors and sub-contractors, suppliers and users) working cohesively to construct a building within an agreed timeframe (Andrew et al. 2006). Embedded within the construction process is the inspection cycle, a cycle in which stakeholders carry out checking procedures to ensure that the building being constructed meets the project requirements (Merritt & Ricketts 2001). These checks would routinely be conducted throughout the duration of the construction project and often involve stakeholders specifically benchmarking items through the use of checklists. The defects inspection process is one such example. It involves stakeholders such as builders, architects, project managers and clients conducting visual inspections of the building looking for items that have failed to reach the project requirements and attempts to rectify them. It is typically scheduled to take place toward the end of the construction process, just before the final handover to the clients (see Figure 4-2).
Figure 4-1: Typical phases and activities in the life cycle of a construction project (adapted from Cranwell & Hunter 1997)
However, within this particular construction project, the defects inspections were not at a point where construction was almost completed, but instead, the defects inspections were completed in parallel with the fit-off stage (see Figure 4-3) in which interior items such as cupboards, shelves, door stops and tapware are installed. This, in turn, meant that the defects inspection team were attempting to identify the defects as the contractors were trying to complete the construction of the building. In total, over 15,000 defects were identified over a space of 14 weeks.

Figure 4-2: Typical construction process in which the defects inspections happened after the fit-off stage

Figure 4-3: The defects inspection process happening in parallel with the fit-off stage

Through the implementation of an Information Audit, the study was able to identify seven formal sub-processes in the defects inspection stage. These were: Initial Inspections (builders only), Rectification, Second Inspection (builders only), Third Inspection (builders, architects and project manager), Final Inspections (builders, architects and project manager), Weekly Design Meetings and Client Approval. The Information Audit identified that there were sixteen separate lists of defects created during the seven sub-processes. The research also showed that these seven formal sub-processes and sixteen lists were supplemented by an additional formal process and eight additional informal lists created by the stakeholders. The proceeding sections will outline each of the sub-processes and describe the lists that were utilised by the stakeholder group as they completed the defects inspection for this complex construction project.
4.2.1 Sub-process 1.0 – Initial Inspections (Builders only)

Figure 4-4: Sub-process 1.0 – Initial inspections (builders only)

The first sub-process [A] was an initial walkthrough of the construction site to produce the initial defects list. It was used to check the quality of work and finishes that were being produced by the tradespeople. A typical walkthrough session would involve Alan and Lisa identifying as many visual defects as possible (see Figure 4-5 for an example). Due to the scale of the building, and the restricted timeframe in which all stakeholders were required to operate, two additional builders were brought on to assist in this sub-process. They were to perform the same role as Alan and Lisa. Once a defect had been identified, Lisa would record the details of the defect directly onto a tablet which ran specific defect inspection software – Inspection and Defects Management System (IDMS) and stored results under the file name ‘initial defects list’ [D]. The software required Lisa to add specific details in relation to the defects which included the item, location and any additional comments or images or photographs necessary for the contractors to rectify later on (see Appendix C). Whilst Lisa was recording the details, Alan would make use of an in-house system in which they could physically identify the defect. The system...
involved the use of colour-coded stickers, where each colour represented an aspect of the defect to be rectified. Table 4-1 provides an overview of the colours used and their meanings.

<table>
<thead>
<tr>
<th>Colour</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green</td>
<td>The use of a green sticker represented a painting issue such as an area that had not been painted or was missing paint. It also represented defective paint-work which included areas in which the quality of the finish was not up to standard.</td>
</tr>
<tr>
<td>Blue</td>
<td>The use of the blue sticker represented a cleaning issue. This sticker was used to identify items that had been completed to specification, however, had not had their final clean. It also indicated items that required the wrapping removed i.e. the plastic film that covered the whiteboards.</td>
</tr>
<tr>
<td>Orange</td>
<td>The use of the orange sticker represented items that were incorrect, incomplete or missing. Examples of these would include: a missing door, a whiteboard that had been installed in the wrong location or a window awaiting a seal.</td>
</tr>
<tr>
<td>Red</td>
<td>The use of the red sticker represented items that has already been installed but due to the building process were broken and needed to be replaced. It also represented items that were faulty i.e. a lock that would not open properly.</td>
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Table 4-1: The colour-coded sticker system

This system had been utilised on past projects in which Alan had been involved and was carried over to this project as it was deemed beneficial by the construction company to both the contractors and themselves. The system allowed contractors to quickly identify the exact location of the defect without spending too much time sifting through the comments on the rectifications list sent to them by the builders. From the builder’s perspective, the system allowed them to save time as they did not have to spend as much time describing the location and extent of the defect.
Figure 4-5: The use of an orange sticker to indicate the incomplete installation of a light fitting

Although a tablet, which was supplied by the construction company and integrated directly onto the IDMS (the software application the builders used to manage the defects), was the primary device for recording the defects, it was often observed to be slow and unreliable. This meant that an additional hand written list needed to be produced [B]. This was confirmed by Lisa who stated: ‘I have to manually insert it into IDMS because the tablets can play up sometimes’. It was then the responsibility of Lisa to return to the site office to manually insert each individual defect into the IDMS under the ‘Initial defects list’ [D] – this process could sometimes take two to three hours.

As mentioned above, two additional builders were brought on to assist in the identification of defects in this sub-process. Although they performed the same role, they did not record the defects in the same manner as Lisa. Not having access to the
tablet supplied by the construction company forced them to make use of a blank template sourced from the IDMS (see Figure 4-6 below).

**Figure 4-6: Blank template which the additional builders used**

<table>
<thead>
<tr>
<th>Defects</th>
<th>Area</th>
<th>Staff</th>
<th>Description</th>
<th>Position</th>
<th>Passed</th>
<th>Comments (Defect)</th>
<th>Date</th>
<th>Company</th>
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Once the additional builders had completed their inspections and filled in the template – which would be now referred to as the ‘additional builder’s list’ [C] – it would be sent directly to Lisa for manual insertion into the IDMS ‘Initial defects lists’ [D]. At the end of each working day, Lisa would run a report through the IDMS and produce three separate lists that varied in detail. These lists would then be sent off to the various stakeholders for action or verification. At this stage in the defects inspection process, the architect’s and project manager’s lists [E] and [F] contained almost identical detail (changes to the name of the file to reflect who it was being sent to) in which a summary of the defects was provided for verification, whereas the contractor’s list [G] was personalised and contained additional information relating only to the defects for which they were responsible. The contractors’ list was also used as the basis for the rectification which followed.
4.2.2 Sub-process 2.0 – Rectification

Figure 4-7: Sub-process 2.0 – Rectification

The second sub-process [A] involved the builders sending a list of items that required rectification to the contractors. Contractors were subsequently provided with three to five working days to rectify defective items that had been identified in the initial inspection stage. Once the rectifications had been completed, each contractor would create a list of the items rectified [B] and send it back to the builders (namely Lisa) via email. Any outstanding unrectified items were also sent back to the builders in the same email with an indication of when these tasks would be completed. The contractors’ rectified items lists would then be collated by Lisa and brought along to the third sub-process [C], where the builders conducted their secondary inspections, which followed this sub-process.
Chapter Four: The Defects Inspection Process

Figure 4-8: An example of a defective door beam which needed to be rectified

Defective door
4.2.3 Sub-process 3.0 – Second Inspection (Builders only)

The third sub-process [A] involved the builders conducting secondary defect inspections of the building spaces. During this process, the contractors’ rectified items list, as detailed above in Section 4.2.2, was brought along by Lisa for verification and checked off against the initial defects list created during the initial inspections as outlined in Section 4.2.1. Any new or unrectified items would then be entered directly into the IDMS via the tablet and stored under a file labelled ‘master register list’ [D]. This list was used to consolidate outstanding defects that had not been rectified. However, as mentioned in Section 4.2.1, the use of the tablet was not always reliable hence, Lisa created her own set of hand written notes [E] which followed a similar format to that adopted by the two additional builders identified in Section 4.2.1. These hand-written notes would then be transferred into the IDMS upon her return to the office.

Through the use of the IDMS, Lisa was able query the ‘master register list’ [D] and create an updated list of items that needed to be rectified by the contractors; this would be labelled ‘updated contractors’ list’ [B]. This list was then sorted and sent
to the individual contractors for rectification [C] of defects to be carried out. The contractors would once more follow the process of rectification as outlined in Section 4.2.2. At the same time as creating the ‘updated contractors’ list’ Lisa would also create updated lists - architect’s list v2 [F] and project manager’s list v2 [G] - for both the architects and project manager in preparation for the next subprocess [H] in which they were to participate in the defect inspections.

Items that were identified as being rectified had their status changed in the IDMS from receiving a ‘no’ in the ‘passed’ column to a ‘yes’ (see Figure 4-12 and Appendix C for the printout copy) and a completion date entered. The system would then automatically remove the defective item from the ‘master register list’ and mark it as being complete.

4.2.4 Sub-process 4.0 – Third Inspection (Builders, Architects and Project Manager)

Figure 4-10: Sub-process 4.0 – Third inspection (builders, architects and project manager)

The fourth sub-process [A] (the third inspection session) was the first time the project manager and architects were invited to participate in the on-site defects inspections (see Figure 4-10). It was assumed that by this stage in the defects
inspection process, the builders had reached a point at which a majority of the defects had been identified and rectified. Similar to that of sub-process 3.0 (Section 4.2.3), the fourth process involved the verification of the items that had been rectified by the contractors by comparing them against the updated lists [G] and [H] that were distributed by the builders to the project manager and architects. Whilst on-site, and through the use of the tablet, Lisa would once again record the items that had passed inspection. Changes would then be made directly onto the IDMS in which the ‘pass status’ of an item would be changed from ‘no’ to ‘yes’ and a completion date would be entered (See Figure 4-12). Upon her return to the office, Lisa would then execute another query in the IDMS searching for all the defective items that had recently had their ‘pass status’ changed to ‘yes’. This would form the basis for the ‘rectified items list’ [F] and would be carried over to the final inspection process for sign-off (see Section 4.2.5).
Figure 4-11: Colin and Andrew conducting defects inspections
Figure 4-12: Change in ‘passed’ status and completed date entered into the IDMS

<table>
<thead>
<tr>
<th>Bldg</th>
<th>Level</th>
<th>Name</th>
<th>Defect Area &amp; Location</th>
<th>Passed</th>
<th>Comments</th>
<th>Completed</th>
<th>Location</th>
<th>Location: North Zone</th>
</tr>
</thead>
<tbody>
<tr>
<td>C101</td>
<td>2/F</td>
<td>Door 1</td>
<td>Door Latches - Painted</td>
<td>No</td>
<td>Initial error in paintwork</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C101</td>
<td>2/F</td>
<td>Door 2</td>
<td>Door Latches - Painted</td>
<td>No</td>
<td>Initial error in paintwork</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C101</td>
<td>2/F</td>
<td>Door 3</td>
<td>Door Latches - Painted</td>
<td>No</td>
<td>Initial error in paintwork</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C101</td>
<td>2/F</td>
<td>Door 4</td>
<td>Door Latches - Painted</td>
<td>No</td>
<td>Initial error in paintwork</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C101</td>
<td>2/F</td>
<td>Door 5</td>
<td>Door Latches - Painted</td>
<td>No</td>
<td>Initial error in paintwork</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(Please note: due to the ethics requirements of this project, all identifiable names have been removed.)

The role of the fourth sub-process was to also identify any new or unrectified defective items that were previously overlooked by the builders [C]. These items were recorded by Lisa in the same manner as they were in sub-process 3.0 (see Section 4.2.3) and subsequently added to the ‘master register list’ [B] and sent back to the contractors for rectification.

It was during this sub-process that the architects and builders established the ‘design issues list’ [E]. This list comprised all the items that were not deemed as construction defects as they were built correctly to the original contractual specifications. Instead, due to creative and artistic differences the architects wished to have them changed. An example of such an item was the door-stops (See Figure 4-13). Although they were built to the correct specifications and met the required Australian standards, the architects felt like they didn’t look right and didn’t fit in – George, therefore, asked for them to be changed. These items were not entered into the IDMS as they were not recognised as a defect but instead, Lisa hand-recorded the issues in her note book to bring to the weekly design issues meetings for further clarification and negotiations (see Section 4.2.6).
Although official processes dictated that Lisa was responsible for the management of all the defects identified, it was observed in the research that the stakeholders involved would often supplement these lists with their own. In total four additional lists were created [D], [I], [J] and [K] for this process and each varied in the way the information was recorded, coded and stored. Upon further inspection and questioning of the stakeholders involved, these particular lists were often used for personal reference in relation to specific items or to help fulfil their own organisational information management practices (see Chapter 6).
4.2.5 Sub-process 5.0 – Final Inspections (Builders, Architects and Project Manager)

Figure 4-14: Sub-process 5.0 – Final inspection (builders, architects and project manager)

The fifth sub-process [A] involved the stakeholders visually inspecting the building for defects one last time before they completed a ‘sign-off list’ [B] to signify that the defects inspection process has been completed and that the building was ready for handover.

As described in Section 4.2.4, the ‘rectified items list’ [D] was carried over from the fourth sub-process (third inspection) and checked for completeness. It was also observed that stakeholders brought along and made use of the personalised lists [E], [F] and [G] they had created during the fourth process (see Section 4.2.4).

Due to the nature of the defects inspection process running in parallel with the fit-out stage of the construction process, it was inevitable that additional defects would be identified. Any additional defects or defective items that had yet to be rectified were hand-written by Lisa onto a new list labelled ‘additional defects list’ [C]. On her subsequent return to the office, Lisa would manually enter the additional defects identified during the inspection into the ‘master register list’ on the IDMS and at
the same time make sure that the unrectified items were still listed as active i.e. listed a ‘no’ in the ‘passed’ column (See Figure 4-15).

Figure 4-15: IDMS’ Master Register List

The ‘Passed’ column in which a ‘no’ indicated that an item was still active and unrectified

(Please note: due to the ethics requirements of this project, all identifiable names have been removed.)
4.2.6 Sub-process 6.0 – Weekly Design Meetings

Figure 4-16: Sub-process 6.0 – Weekly design meetings

The sixth sub-process [A] involved the builders, architects, project manager and selected contractors sitting down on each Wednesday afternoon for a meeting to deal with a variety of design issues related to the building. Stakeholders would often discuss issues such as altering the materials used in certain sections of the building due to aesthetics, constructability or performance issues. It also included the discussions in relation to the acquisition of the products specified within the contract schedules. This was particularly important as items that were initially specified may no longer be available due to the time taken (approximately 4.5 years) to get from the signing of the contracts to the physical installation of an item. An example of this would be the digital TV screens that were installed in each of the classroom spaces. By the time the builders were ready to procure and install this item, four years had passed. This, in turn, meant that the model originally specified within the contracts was no longer available and an alternative or equivalent model needed to be sought (See Figure 4-17). Another reason which resulted in the altering of materials was related to the changes in regulations. As an essential requirement of the building project was to meet the ‘five-star green star energy rating’ for an educational building as specified by The Green Building Council of Australia, any
item that did not meet this criteria was subsequently removed and an alternative sought.

Figure 4-17: An alternative model of a TV screen that was installed

Within the context of the defects inspection process, the weekly design meetings provided the architects with an opportunity to make design changes on items that had been built and had not been deemed defective (see Section 4.2.4). The process involved the examination of Lisa’s official ‘design issues list’ [F] in conjunction with any additional items listed on the personalised ‘architect’s design issues list’ [E]. It was observed that these lists were often very similar and that a majority of the items were repeated. The only major difference between the two would be the level of detail recorded. The ‘architect’s design issues list’ would often include a greater level of detail such as the inclusion of an annotated photo with the rationale attached (see Figure 4-18), whereas the builder’s list would specify the item, location and a brief comment.
Once the design item lists have been presented by the Architects to the building team (building project manager and senior building supervisors), a round of negotiations began in relation to the acceptance to the design item changes. Its purpose was to seek approval on these changes, as it was a variation from what was stipulated on the building schedules and contractual agreements with the clients. Smaller items such as adding an extra seal to a door would often be approved by the building team on the spot as there was an in-built costing margin already allocated. Whereas larger items, such as the upgrade of all the door stops in the building, would bear an additional cost to the client and would be recorded in an
‘items for approval list’ [C] by the project manager and tabled at a separate meeting with the client (see Section 4.2.7).

Design items that have been approved for change would be recorded in two locations, the first being an ‘additional items to be rectified list’ [D]. The builders would no longer view these items as design issues, instead, they would be classified like any other defect. They would be manually entered into the IDMS by Lisa and sent out to contractors for rectification. The second is a personal list created by the architects and labelled ‘architect’s outcomes list’ [B]. This list outlines the items that have been approved for changes and require them to update their drawings and documentation accordingly (see Section 4.2.8).

4.2.7 Sub-process 7.0 – Client Approval

Figure 4-19: Sub-process 7.0 – Client approval

The seventh sub-process [A] involved a separate meeting between the project manager and client where the primary focus was to obtain approval for the design issues identified in defects inspections and brought to the weekly design meetings (see Section 4.2.6). A list of the items that the architects wished to be changed was tabled [B], including any additional costs that had to be covered. It was then up to the client to decide if they wanted to go ahead with the suggested changes. Once the client had agreed on the suggested changes, they were to sign-off on the ‘approved items list’ [C]. This list would then be brought back to the weekly design meetings [D] (see Section 4.2.6) by the project manager to be actioned by the architects and by the builders.
4.2.8 Sub-process 8.0 – Update Documentation

Figure 4-20: Sub-process 8.0 – Update documentation

As a direct result of the weekly design meetings [A] (see Section 4.2.6), an additional process was created in which the documentation such as the schedules and drawings were required to be updated. The information for this list would be derived from the ‘Architect’s outcome list’ [B] (see Section 4.2.6). It was of upmost importance that this sub-process was completed as the documentation needed to correspond to what was being built. It also provided the builders and contractors updated versions of the documentation in order to complete the defects inspections and construction of the building.

Once the architects had updated the documentation, a copy would be sent to the builder’s project manager. It was his responsibility to disseminate it to the rest of the building team through the use of the knowledge management software - ACONEX. It was observed that before the start of every defects inspection session, Lisa would check this system to make sure she had the most recent version of the drawings. If a newer version was identified, Lisa would print it out and bring it along to the Final Inspections [C] (see Section 4.2.5). The architects also made use of a similar system in which they too would check their own systems for the latest version of the documentation before commencing inspections.
4.2.9 The Entire Defects Inspection Process

Sections 4.2.1 to 4.2.8 provided a description of the seven sub-processes and identified each of the lists that were utilised by each stakeholder within the overall defects inspection process. As a result of conducting an Information Audit, seven formal sub-process were identified in which sixteen lists were generated. This was supplemented by an additional sub-process and eight informal lists that were created and maintained by the stakeholders (See Table 4-2). Figure 4-21: ‘The defects inspection process’ illustrates the complexity of the overall process and how each of the sub-processes interacted with one another.
Figure 4-21: The defects inspection process
<table>
<thead>
<tr>
<th>Formal Process</th>
<th>Informal Process</th>
<th>Formal List</th>
<th>Informal List</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial Inspection (Builder only)</td>
<td>Update Documentation</td>
<td>Initial defects list</td>
<td>Builder’s hand written notes (sub-process 1.0)</td>
</tr>
<tr>
<td>Rectification</td>
<td></td>
<td>Architect’s list v1</td>
<td>Additional builder’s list</td>
</tr>
<tr>
<td>Second Inspection (Builder Only)</td>
<td></td>
<td>Contractors’ list v1</td>
<td>Builder’s hand written notes (sub-process 3.0)</td>
</tr>
<tr>
<td>Third Inspection (Builders, Architects and Project Manager)</td>
<td></td>
<td>Project Manager’s list v1</td>
<td>Architect’s design issues list</td>
</tr>
<tr>
<td>Final Inspection (Builders, Architects and Project Manager)</td>
<td></td>
<td>Contractors’ rectified list</td>
<td>Architect’s personal list</td>
</tr>
<tr>
<td>Weekly Design Meetings</td>
<td></td>
<td>Updated Contractors’ list</td>
<td>Builder’s personal list</td>
</tr>
<tr>
<td>Client Approval</td>
<td></td>
<td>Master register list</td>
<td>Project Manager’s personal list</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Architect’s list v2</td>
<td>Architect’s outcome list</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Project Manager’s list v2</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Additional defects list</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Design issues list</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Rectified items list</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Additional defects list</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Items for approval list</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Approved items list</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Final list (with signoff)</td>
<td></td>
</tr>
</tbody>
</table>

Table 4-2: Summary of the processes and lists involved in the defects inspection process
The process elements represented in blue indicate the formal processes which were agreed upon by the stakeholders involved in the defects inspection process. What seemed to be a simple linear process, as described by Lisa (see Figure 4-22), where one sub-process led directly into another, did not eventuate as this process was seen as iterative. Through the execution of an Information Audit, in conjunction with various other data collection methods (see Chapter 3.5), it was established that the defects inspection process happened in an iterative manner in which stakeholders cycled through constantly identifying and rectifying defects.

Figure 4-22: Lisa’s hand written explanation of the defects inspection process
As described in Section 4.2, the defects inspection process could not have proceeded in a linear fashion as it was completed in parallel with the fit-off stage. This, in turn, meant that:

- An item could go through four or five inspections before it had been rectified. This could be attributed to the procurement of materials or the availability of labour.
- A defective item could be identified for the first time during any of the first five sub-processes (see Sections 4.2.1 to 4.2.5).
- An item that had been deemed to have passed inspection the first time might be identified as a defect later on. Typical examples included: re-cleaning of items in which contractors have soiled as they carried out building or rectification works, or any items damaged as a direct result of the construction process (i.e. broken windows or chipped bench tops).

The use of the information audit also identified seven additional lists (represented in green) created by stakeholders in order to complete and make sense of the defects inspection process. These lists did not form part of the formal process. Instead, they were used as personal reference lists or to assist the stakeholders in fulfilling their own organisational information management requirements (see Chapter Eight). Sub-process 8.0 – Update documentation was represented in green as it was seen as a process that was not normally associated with the defects inspection process. As described in Section 4.2.4 this process only became relevant as stakeholders established and implemented a ‘design issues list’.

4.3 Summary

This chapter presented the findings of an information audit conducted on the defects inspection process for a state of the art purpose-built education building. It provides a clear understanding of how this process was undertaken and the roles and responsibilities of stakeholders. In total, the study was able to identify seven formal sub-processes in which sixteen separate lists were created. This was supplemented by an additional process and eight informal lists were created and maintained by the stakeholders.
Although the use of a tablet was the formal method used to record the defects, it was often deemed to be too slow or unreliable. Hence, it was frequently supplemented or substituted by stakeholders using hand-written notes. It was also observed that data in relation to the defects would often be duplicated in order for individual stakeholders to make sense of the complexity or to meet their own organisational information management requirements.

The findings also established that the defects inspection process was complex and did not follow a linear model as understood by one of the major stakeholders (see Section 4.2.9); rather, it took on an iterative approach in which stakeholders were constantly cycling through identifying and rectifying defects.

This chapter presented the findings from an information audit conducted during the defects inspection process of the case study project as outlined in Chapter One. The findings from this chapter drew upon data from a variety of sources such as on-site observations, document collection and interviews. The next chapter (Chapter Five) will present and discuss the use of tacit knowledge in the management and sharing of information during the defects inspection process.
5 The Use of Tacit Knowledge in the Management and Sharing of Information within the Defects Inspection Process

5.1 Introduction

This chapter will present the research findings as they relate to the stakeholders’ use of tacit knowledge in the management and sharing of information within the defects inspection process. The primary focus of the chapter will be on the stakeholders’ information management and sharing practices rather than on an examination of their existing knowledge management practices. The findings from this chapter draw upon data that was collected from a variety of sources such as on-site observation sessions, document collection and interviews (see Chapter 3.5). Specific examples are provided in terms of how stakeholders made use of their tacit knowledge through a series of vignettes (Stake 1985) (represented in grey boxes) and direct quotes in order to demonstrate how these factors often overlapped and were dependent on one another.

5.2 The Role of Tacit Knowledge in the Management and Sharing of Information

Polanyi (1967) described tacit knowledge as ‘knowing more than we can tell, or knowing how to do something without thinking about it, like ride a bicycle’ (Polanyi 1967, p. 4). According to Smith (2001), tacit knowledge can be seen as personal knowledge, something that cannot be expressed in its entirety. It tends to be localised and cannot be found in explicit materials such as manuals, books, databases or files.

The following sections will explore the role of tacit knowledge in the management and the sharing of information during the defects inspection process. Data from the case study is presented first in the form of vignettes then later substantiated through the extraction of specific quotes as a result of conducting the follow-up interviews.
Chapter Five: The Use of Tacit Knowledge in the Management and Sharing of Information within the Defects Inspection Process

5.3 Colin’s Stories:

The following section will explore Colin’s use of tacit knowledge to manage and share information during the defects inspection process. It will begin by providing a description of how he typically began this process followed by a series of exemplar stories.

5.3.1 How Colin Typically Began a Defects Inspection Session

A typical inspection session with Colin would often begin with him leaving from a previous meeting and clutching his notebook and a copy of the drawings from his desk along the way. Colin rarely printed off the defects inspection lists that Lisa sent him as described in Chapters 4.2.1 and 4.2.3, instead, he relied upon her copy whilst conducting the on-site inspections. Upon arrival at the construction site office (directly opposite to the construction site), Colin would spend ten to fifteen minutes chatting to Alan and Lisa in relation to issues such as the colour of the skirting boards that were raised during the previous defects inspection sessions as well as obtaining updates on the status of the building. Once briefed, Colin then proceeded to a cupboard situated behind the reception desk and changed into the safety gear (fluoro vest, hard-hat, steel capped boots and safety glasses) that was provided by the builders and made mandatory by the State Government (Work Safe Victoria) under their occupational health and safety (OH&S) regulation. Colin would then seek out Alan and Lisa once more so that they could head across the road to the construction site and begin their inspections for the day.

5.3.2 Story 1 – “Picking out Patchy Paintwork”

It was during the second observation session in which the researcher first observed Colin’s use of tacit knowledge. This session revolved around Alan and Lisa in conjunction with Colin inspecting the classroom spaces on level three. Upon entering classroom space 3.06, Lisa would load the corresponding defects inspection list on her tablet and go through each item one by one. It was then up to Alan and Colin to identify if the defect had been rectified by verbally responding to Lisa with a ‘yes’ or ‘no’. Once this process had been completed, the stakeholders then proceeded to identify any additional defects. At this stage Lisa suggested that
the paintwork on the south facing wall was defective as it looked ‘patchy and not up to standard’. Alan agreed with her sentiments and proceeded to place a green sticker on the area in question. Colin then promptly interrupted and stated that the paintwork was ‘not defective and that it shouldn’t be identified as one’. His rationale for this was that if you stand 1.5m away from the wall and not notice it, then it should not be classified as a defect. He then proceeded to demonstrate his point by asking both builders to stand 1.5m away from the wall and inspect it once more. Both Alan and Lisa agreed with his rationale and subsequently the defect was not recorded. Alan then questioned Colin on how he knew this. To this he responded by saying: ‘I don’t know where I got it from... I’ve always gone by that rule’.

Figure 5-1: An example of patchy paintwork
5.3.3 Story 2 – ‘Kicking Carpet Into its Place’

It was during the third observation session in which the researcher observed Colin’s use of tacit knowledge once more. This session revolved around Alan and Lisa in conjunction with Colin checking the floor coverings on level three for defects. Upon entering the office spaces, Colin began to shake his head. He then proceeded to head towards an area in which the carpet did not sit properly under the skirting boards, and without thinking about it, began to kick the carpet tile so that it sat flush under the skirting board. Colin then stated: ‘one less defect to fix!’ Lisa then responded to this statement by asking him how he knew that kicking the carpet tile would fix the problem, and to that, he responded: ‘I don’t really know, I saw a guy do it once and thought I would give it a try’. Lisa then gave a bit of a chuckle and said, ‘I’ll remember that trick for next time! Thanks to you [Colin], that’s one less thing for me to record’.

5.3.4 Story 3 – “Documents? There’s no Need!”

The fourth observation session was another in which Colin demonstrated his use of tacit knowledge. This session revolved around Alan and Lisa in conjunction with Colin inspecting the corridors outside the classroom spaces. As the inspections were completed quite quickly, the stakeholders decided to continue on and defect the classroom spaces on level five. As the builders were walking up the stairs, Lisa asked if Colin if he required a copy of the drawings and defects lists, and if so, she would head back downstairs and across the road to collect them. To this Colin responded: ‘Documents? There’s no need, I’m pretty sure we can get by without them’. So for the remainder of the inspection session (which lasted for another one and a half hours), Colin was able complete the inspections without reference to the drawings in which he would usually carry along with him.

5.4 Colin’s Interview Responses:

The following section explores Colin’s use of tacit knowledge in order to manage and share information. The analysis is a direct result of both the on-site informal interviews and the formal follow-up interviews conducted with Colin and the other stakeholders at the conclusion of the defects inspection process.
It was often observed that during the defect inspections, senior architects and builders would rely more upon their tacit knowledge rather than constantly spending additional time referring back to other forms of explicit knowledge such as the drawings or any other forms of documentation. In order to substantiate these observations, subsequent follow-up interviews were conducted with stakeholders.

In response to a question that was posed in relation to his knowledge of the defects inspection process Colin stated:

“You see when I first started in this business I wouldn’t have known what, you know … you got an idea of what’s acceptable and what’s not acceptable. But you just build up that knowledge over a period of time.

Although the statement provided above by Colin could be seen as covering multiple aspects of experience and domain-specific knowledge, his response was framed within the context of his use of tacit knowledge to manage and share information within the defects inspection process. The statement along with the on-site observations demonstrated Colin’s use of personal knowledge in which he had acquired over a period of time. This knowledge was not formally recorded anywhere, but instead, resided within him and could be recalled to provide specific information on any issues related to a particular defect or the defects inspection process. Upon further exploration of Colin’s use of tacit knowledge to share and manage information, the researcher questioned Colin’s approach to defects inspections, to which he replied:

“So how I approach that is really just your own interpretation of what you consider acceptable and what’s not acceptable. So you have to have a bit of an idea of...what is good tradesmanship and what is not...what you can achieve and what you can’t achieve.

The statement above demonstrated that as Colin completed the defects inspection process, he relied more upon his own interpretations and the tacit knowledge he possessed rather than documented material produced for this construction project. It was observed that during the on-site observations, Colin rarely found the need to carry around additional forms of explicit documentation such as the schedules to complete his tasks. Instead, his tacit knowledge was based more upon his learning,
experience and expertise (see Section 5.7). The management of this information often took place within his head whereas the sharing of information transpired through verbal means as demonstrated by the following response, ‘If I knew something that was important to the project, I wouldn’t really write it down, because it’s often easier to tell someone’.

In order to verify the data that was being provided by Colin and that the on-site observation sessions were accurate, the outcomes of the analysis were also cross-referenced against data collected from the builders. Both builders noted that there were distinct differences between the participating architects, especially in terms of their use of tacit knowledge to manage and share information. When Alan was questioned in relation to Colin’s reliance on tacit knowledge he responded by stating:

*I guess there were differences between the two [Colin and George]... you know, he [Colin], you know, was a bit more laid back and he ultimately has been around a lot longer and knows probably ... knows the process of defecting and what his role and the builder’s role is and just did it.*

The statement provided above by Alan demonstrated how Colin made use of his tacit knowledge to complete the defects inspection process. As Polanyi (1967, p. 1) stated: ‘tacit knowledge is knowing how to do something without thinking about it’ in this instance, Alan’s response suggested that Colin knew the process of defect inspections and did not need to consciously think about it in order to complete it.

When Lisa was asked the same question in relation to Colin’s reliance on tacit knowledge, Lisa responded by stating:

*‘I think he [Colin] has been doing it for a lot longer [than most of us], he goes a lot more on intuition, you know. So he [Colin] didn’t say, “I don’t have a plan”, he’d be like, “it [the item in question] doesn’t look right and therefore it mustn’t be right”.*

The statement provided by Lisa could be seen as covering multiple aspects including experience and domain-specific knowledge. However, it would be presented in this section within the context of tacit knowledge. Lisa’s comments in
relation to Colin’s use of tacit knowledge confirmed both the researcher’s observations and Colin’s personal comments. Lisa’s comments suggested that Colin relied more upon the use of his tacit knowledge, and made little or no reference back to explicit documentation. This could be seen as consistent with Smith (2001) who argued that tacit knowledge is not something that can be expressed in its entirety and cannot be found in explicit material.

Through the researcher’s observations and examination of the interview data, it is suggested that Colin had a stronger preference toward the use of tacit knowledge to manage and share information. In doing so, Colin was able reduce the time spent checking the explicit forms of documentation, thus allowing the inspection process to continue-with minimal delay. With respect to his information sharing practices, it was observed that Colin tended to internalise what he knew and only shared bits of this information via verbal means when prompted by an event or questioning from the other stakeholders.

5.5 George’s Stories:

The following section will explore George’s use of tacit knowledge to manage and share information during the defects inspection process. It will begin by providing a description of how he typically began this process followed by a series of exemplar stories.

5.5.1 How George Typically Began a Defects Inspection Session

A typical inspection session with George would begin with a cup of coffee at the coffee shop downstairs from his office. During this time, George would spend some time reading through the defects inspection lists sent to him by Lisa (see Chapters 4.2.1 and 4.2.3). He would often place a little star next to the items for which he required further clarification or wished to focus on during the defects inspections he conducted with Alan and Lisa. Upon finishing his coffee, George would often check two or three times to make sure that he had packed everything he deemed necessary into his back-pack for the inspections. The back-pack would typically contain a copy of the drawings for the floors he was to inspect, a copy of the building schedules (specifications and descriptions of the items used within the
building), his personal notebook to record the defects, a camera to take photos of items that were to go on the design items list and a copy of defects inspection list as mentioned beforehand. George then made the ten minute walk up the road to the construction site office where he quickly changed into the safety gear provided to Alan and Lisa (similar to that of Colin in Section 5.2.1) and then would seek out Alan and Lisa to begin the defects inspections for the day.

5.5.2 Story 1 – ‘Framing the Door’

It was during the eighteenth observation session in which the researcher observed George’s use of tacit knowledge. This session revolved around in conjunction with George inspecting the office spaces on level nine. Upon inspection of the office door frames George stated that ‘there is something wrong with the door frames, they do not look right’. To that, Alan responded: ‘they look right to me... we have built them to your specifications’. Normally at this stage, George would be checking through the explicit forms of documentation stored in his backpack to make sure that what he was saying matched what was documented. However, this time around he was adamant that he was correct by stating over and over again: ‘I just know that they are wrong’. Eventually, he persuaded the builders to place the item on the defects inspection list. During subsequent inspection sessions and the cross-referencing with the schedules, it was revealed that George was indeed correct, the door frames were meant to be lightly sanded back and stained in a lime colour so that you could see the grain in the timber rather than being painted over in gloss white.
5.5.3 Story 2 – ‘The Touch and Feel Factor’

It was during the twentieth observation session in which the researcher observed Colin’s use of tacit knowledge once more. This session revolved around Alan and Lisa in conjunction with George inspecting the staircase that led from level seven to eight. Upon inspection, George started to touch and feel the railings checking for the quality of finish and the workmanship. Then, without reference to any form of explicit documentation, George stated: ‘Yes, this is exactly what we’re looking for’ and proceeded to the next inspection item on Lisa’s defects inspections list. For the remainder of defects inspection process, it was observed that George made less use of the explicit forms of documentation, but instead, adopted the technique which involved the identification and judgement of defects through ‘touching and feeling’ with reference to the tacit knowledge which resided within him.
5.6 George’s Interview Responses:

The following section explores George’s use of tacit knowledge in order to manage and share information. The analysis is a direct result of both the on-site informal interviews and the formal follow-up interviews conducted with George and the other stakeholders at the conclusion of the defects inspection process.

Throughout the duration of the defects inspection process, the researcher observed that, although George performed the same role as Colin, he used considerably less tacit knowledge to manage and share information. It was not until towards the end of the process in which George began to demonstrate his ability to be less reliant on explicit forms of documentation and make use of the tacit knowledge he had obtained as a result of conducting the defects inspections. In order to substantiate these observations, subsequent follow-up interviews were conducted with George.

In response to a question posed in relation to his use of tacit knowledge throughout the defects inspection process he replied:

*After a few weeks or so you begin to memorise all the cut-offs, finishes, or to visualise what the room should look like, you are then able to walk into a new space for the first time and say exactly what’s wrong. Same thing goes for the drawings... after you have had looked at the drawings and dealt with issues a couple of times you know what is happening now, you know... you get a better feel for the information and you don’t need to rely on a set of documents.*

The researcher observed that after a period of time, George became less reliant on the explicit, and more formal, forms of documentation and shifted towards the use of his tacit knowledge to manage and share information.

At the conclusion of the interviews, George was asked to reflect on his use of tacit knowledge to manage and share information. He responded, ‘*I can say that as the project progressed, I have come to realise that the information I needed to complete the defects was sitting somewhere in the back of my head.*’

This statement once again confirmed George’s shift from his reliance on explicit forms of documentation to the use of tacit knowledge to manage and share
information within the defects inspection process. His reflection indicated that the knowledge he possessed, which could be found in explicit forms of documentation related to this project, could also be found residing within him in the form of tacit knowledge.

In order to verify the data that was being provided by George and that the on-site observation sessions were accurate, the findings were also cross-referenced against that of builders. When Alan was questioned in relation to George’s reliance on tacit knowledge he responded by stating, ‘I think he [George] knew what he needed to do, at the start we spent a lot of time checking the documents, but by the end things happened a lot quicker’.

The statement provided above by Alan indicated that although George was competent and had a solid understanding of the defects inspection process, he would often spend a lot time checking explicit forms of documentation making sure that they matched what was being built. Alan also alluded to the fact that as the process progressed, George would make greater use of his tacit knowledge to manage and share information, which in turn, speed up the process. These sentiments were also echoed by Lisa who stated, ‘He [George] began to memorise things and things just happened quicker… and so there was less checking of the documents’.

Through the researcher’s observations and examination of the interview data, it was apparent that there was a shift in the way George made use of his tacit knowledge to manage and share information. As the process progressed, George began to gain confidence through the experiences he had encountered. This in turn, led to him making greater use of his tacit knowledge to complete the defects inspections and spend less time referring back to the explicit forms of documentation he was accustomed to.

5.7 Alan’s Stories:

The following section will explore Alan’s use of tacit knowledge to manage and share information during the defects inspection process. It will begin by providing a description of how he typically initiated this process followed by a series of exemplar stories.
5.7.1 How Alan Typically Began a Defects Inspection Session

A typical inspection session with Alan would begin when either Colin or George arrived at the construction site office. Upon their arrival, Alan would begin by discussing any outstanding issues from previous inspection sessions or update them with the current status of the building. Once this was complete, Alan would then head over to reception to collect the coloured stickers (see Chapter 4.1) that would be used in identification of new defects and at the same time checked to see if he had his mobile phone with him (see Chapter 6). Alan would then proceed to collect the other stakeholders and begin the defects inspections.

5.7.2 Story 1 – ‘Call in the Tradies’

It was during the first observation session that the researcher observed Alan’s use of tacit knowledge. This session revolved around the Project Manager, Colin and Lisa, in conjunction with Alan, inspecting one of the major lecture theatres on level three. Upon inspection of this space, a wide range of defective items were identified. These ranged from missing paint to a broken chair. As Lisa was recording the defects through the use of the tablet, she was required to allocate a sub-contractor to rectify each defective item. Being new to the role, she had little knowledge of who the sub-contractors were and what each was responsible for, and for this reason, Lisa was often overheard asking Alan, ‘so who do I allocate this job to?’ It was noted that Alan always had a quick response for her and would respond to her by saying, ‘oh that’s Spot on Painting... just send the list out to Joe, he’ll get it done’ (the name of the sub-contracting company and their employees have been altered to protect their anonymity).

5.7.3 Story 2 – ‘It’s All in My Head’

It was during the second observation session in which the researcher observed Alan’s use of tacit knowledge once more. The session revolved around Colin and Lisa in conjunction with Alan inspecting the classroom spaces on level three. Upon entering classroom space 3.07, Alan asked the other stakeholders present to hold off on what they are were doing until he checked off the items on his list. Both the researchers and other stakeholders were a bit perplexed at this statement as it was
observed that Alan did not carry a copy of a list either in physical or electronic format. As Alan then proceeded to inspect the seals on the windows and cover on the light fittings, he elaborated and stated that he had a ‘pre-set items list’ in his head to inspect.

5.8 Alan’s Interview Responses:

The following section explores Alan’s use of tacit knowledge in order to manage and share information. The analysis is a direct result of both the on-site informal interviews and the formal follow-up interviews conducted with Alan and the other stakeholders at the conclusion of the defects inspection process.

Similar to that of Colin, Alan tended to make use of tacit knowledge in order to manage and share information during the defects inspection process. The researcher often observed that Alan tended to make less use of explicit forms of documentation. Instead, he relied upon the tacit knowledge he possessed. In order to substantiate these observations, subsequent follow-up interviews were conducted with Alan in which his response to a question in relation to his use of explicit forms of documentation during the defects inspection stage, he replied, ‘...like, I don’t really look at the documents, I just go off what I know’.

The statement above confirmed the observations of the researcher which suggested that Alan relied less upon the project’s explicit documentation and more upon his personal knowledge to manage the information.

Nonaka (1991) and Smith (2001) argued that tacit knowledge tends to be localised. When Alan was questioned in relation to his use of tacit knowledge to which he responded,

...the information I possess might not always be shared with others. If I don’t work on a similar site, the information might not get passed on ...Well, it’s one of those things, if someone asks, they get the answer. Otherwise I carry this information over to the next project and hopefully it can be used again.

The statement listed above indicated that tacit knowledge (which Alan perceived as information) was indeed internalised. Alan would make use of his tacit knowledge to manage the information, however, this was not shared amongst the others during
the defects inspection process unless it was specifically requested (see Section 5.2.8).

In order to verify the data that was being provided by Alan and that the on-site observation sessions were accurate, the findings were also cross-referenced against that of the Architects. When Colin was questioned in relation Alan’s reliance on tacit knowledge he responded,

Yeah, during the inspections I didn’t really see him [Alan] refer to the documents, he [Alan] kind of went off what he knew... The guy [Alan] was like a walking encyclopaedia, he knew everything, all you had to do was ask.

The statement provided above by Colin confirmed both Alan’s own statements and the observations made by the researcher. They indicated that during the defects inspection process, Alan tended to make less use of explicit forms of documentation. Instead, he relied upon the tacit knowledge that he had amassed over a period of time. The statements also indicated that his knowledge was indeed localised and information was not shared unless a similar event presented itself or it was specifically requested by an individual.

When George was asked the same question in relation to Alan’s reliance on tacit knowledge, George responded:

He’d [Alan] always seemed like he was in control, he knew exactly what to do and when to do it... defecting seemed to be second nature to him... When we completed the inspections together, I noticed that he didn’t carry around any documents.

The statements provided by George confirmed Alan’s reliance on tacit knowledge to manage and share information during the defects inspection process. The first statement highlighted Alan’s ability to complete the process without the need to think about it (Polyani, 1967), whereas the second demonstrated how he was able to make use of tacit knowledge.

Through the researcher’s observations and examination of the interview data, it is suggested that, similar to Colin, Alan had a stronger preference toward the use of tacit knowledge to manage and share information. In doing so, he was able to
demonstrate to the other stakeholders that he was in control. This point was reinforced during his follow-up interview when he was questioned in relation to the process in which he conducted the defects inspections, to this he responded, ‘I guess from my point of view the way that I like to operate myself is to feel that everyone thinks I’m in cruise control’.

With respect to his information sharing practices, it was observed that Alan tended to internalise what he knew and shared bits of this information via verbal means, but only when prompted by an event or questioning from the other stakeholders.

### 5.9 Lisa’s Stories:

The following section will explore Lisa’s use of tacit knowledge to manage and share information during the defects inspection process. It will begin by providing a description of how she typically began this process followed by a series of exemplar stories.

#### 5.9.1 How Lisa Typically Began a Defects Inspection Session

A typical inspection session with Lisa would begin with her checking to see if there were any updated drawings uploaded to ACONEX (see Chapter 4.2.8). If an updated drawing was found, she would then proceed to print multiple copies for the stakeholders involved. Once this task was complete, she would swap to the IDMS and run reports in order to ensure that she had a copy of the latest version of the items in which they were to inspect. Lisa would then proceed to the locked cabinet underneath her desk to collect the tablet as mentioned in Chapter 4.2.1 as well as collecting her personal notebook which would often be found on her desk under a pile of defect inspection lists. It was observed that she would often hold the other stakeholders up as she frantically completed the above mentioned tasks before they could all begin the defects inspections.

#### 5.9.2 Story 1 – ‘I Can Do This Now…’

It was during the twenty-first observation session in which the researcher observed Lisa’s use of tacit knowledge. This session revolved around Colin and Alan, in conjunction with Lisa, inspecting the open office spaces on level six. This session
began like any other that preceded it: rectified items were marked off as being complete and additional defects were identified. However, this time, the researcher observed a change in the way Lisa made use of her tacit knowledge. As her confidence in the undertaking of the defects inspection process grew, she began to become less reliant on the explicit forms of documentation (i.e. defect lists and drawings). She no longer felt the need to rely upon or ask the other stakeholders questions in relation to how the process was conducted. Lisa was now demonstrating what Polanyi (1967) described as tacit knowledge; she was able to do something without thinking about it. It was also noted that in subsequent inspection sessions she was able to take charge of the process in absence of Alan.

5.9.3 Story 2 – ‘Follow Me Into the Toilets…’

It was during the twenty-third observation session in which the researcher observed Lisa shift towards the use of tacit knowledge. This was the first of the sessions in which the defects inspection team would separate into two groups in order to ensure that they were able to complete the inspection process within the agreed time frame specified by the construction schedule. Colin and Alan were to defect the office spaces on level ten, whereas George and Lisa were given the responsibility of inspecting the toilets on level two. Given a choice, the researcher decided to follow George and Lisa as this was the first time the toilet spaces were to be inspected. Walking towards the space, George and Lisa began to have a conversation in relation to who would fulfil the role of Alan in his absence. It was agreed that Colin, in addition to his role of identifying defects, would also be in charge of the colour-coded sticker system (see Chapter 4.2.1), whereas Lisa need only to concentrate on the documentation. As the session progressed, the researcher noticed on many occasions Lisa muttering to herself. Lisa was overheard muttering statements such as, ‘the basin... who’s in charge of that? Oh I know, it’s...’ and ‘oh yeah that is a defect, the exhaust fans should match the colour of the walls’. Upon further investigation, the researcher realised that there was a relationship between Lisa gaining experience and confidence and the initial use of her tacit knowledge. The use of her new found tacit knowledge was able assist her with the documentation of the defects.
5.10 Lisa’s Interview responses:

During the defects inspection process it was observed that Lisa made limited use of her tacit knowledge to manage and share information. Similar to that of George, it was not until towards the end of the process where she became less reliant on the explicit forms of documentation and made use of the tacit knowledge, as expertise, she had obtained as a result of conducting the defects inspections. In order to substantiate these observations, subsequent follow-up interviews were conducted with Lisa and in response to a question about her knowledge of the defects inspection process she replied,

Being a graduate, this was my first defects inspection. I didn’t really know what to do so I made sure I’d followed the documentation... After a while, I kind of knew what to do, I didn’t really need to check the documentation as much.

The statement provided by Lisa above could once again be seen as covering multiple aspects including experience. The statements confirmed the researcher’s observations that, over a period of time, Lisa became less reliant on explicit forms of documentation and shifted towards the use of tactic knowledge to manage and share information.

Just as George was asked to reflect on his usage of tacit knowledge to manage and share information. Lisa was asked to do the same. Upon reflection, Lisa stated, ‘I have learnt a lot from the architects about what they’re looking for and about what the building is. What details didn’t work this time and what not to do next time, and yeah’.

Lisa demonstrated that through conducting the defects inspections with the other stakeholders, she was able to convert the information she had gained through this process and store it as tacit knowledge. This knowledge was then localised and internalised so that it could be called upon once more to manage and share information on proceeding projects.

In order to verify the data that was being provided by Lisa and that the on-site observation sessions were accurate, the findings were also cross-referenced against
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that of the architects. When Colin was questioned in relation Lisa’s reliance on tacit knowledge he responded, ‘I suppose this was her [Lisa] first defects inspection... there were lot of things to pick up... heck, when I started, I had no idea!’

The statement provided above by Colin suggests that Lisa possessed limited tacit knowledge and therefore was unable to make effective use of it to manage and share information. Being her first time, she was also unable to complete the process without thinking about it.

When George was asked the same question in relation to Lisa’s reliance on tacit knowledge, George responded, ‘I noticed toward the end of the inspections she [Lisa] got quicker at noting down the defects... she didn’t need to ask us as many questions, or double check any documents... she just went on with the job.’

The statement above provided by Lisa suggested that, as time progressed, Lisa was able to make use of the tacit knowledge that she had acquired from completing the defects inspections. Through the use of the tacit knowledge as a point of reference, Lisa was also able to reduce the time taken to complete her tasks as additional time was not need to sort through the explicit forms of documentation.

5.11 A Goffman Perspective

The stakeholders’ use of tacit knowledge to manage and share information during the defects inspection process could be demonstrated through application of Goffman’s (1959) dramaturgical perspective. Goffman (1959) suggests that a person’s identity is not stable and an independent psychological entity, but instead, is being constantly remade as the person interacts with others. In his model, Goffman (1959) proposes that social interaction is analysed in terms of how people live their lives as actors on a stage. The analysis of this model incorporates the concepts of ‘status’ and ‘role’, where the ‘status’ is like a part in the play and the ‘role’ serves as a script in which it provides both dialogue and actions for the characters. The model assumes that as on stage, people in their everyday lives are required to manage their settings, clothing, words, and nonverbal actions to provide a particular impression to others. In addition to the concepts of ‘status’ and ‘roles’ Goffman (1959) also emphasises the notions of ‘teams’ and ‘stages’ in which he
refers to ‘teams’ as groups of individuals who cooperate with each other in order to share the ‘party line’. He also notes that members of this team must share information as mistakes are reflected upon everyone. With relation to the notion of a ‘stage’ Goffman (1959) describes this as an area in which different individuals with different roles and information can be found, namely: ‘front stage’ and ‘back stage’ and that there is an important distinction between the behaviour of the two.

- Front stage – where the actors’ actions are visible to the audience and apart of the performance. The person knows that they are being watched and acts accordingly.
- Back stage – where the actors’ are present and the audience is not, performers are able to step out of character without fear of disrupting the performance. It is where the facts that are suppressed in the front stage or various kinds of formal actions may appear. No members of the audience can appear in the back stage and performers take many methods to ensure this.

Within the context of this study, the stakeholders can be seen as being the ‘actors’ performing on a ‘stage’ (the defects inspection process). The group of individuals (stakeholders) were required to work cooperatively with one another as a ‘team’ where information needed to be shared as mistakes were reflected upon everyone involved. The ‘stages’ can be seen as a representation the stakeholder’s use of tacit knowledge to manage and share information. The front stage was an area in which explicit and selected tacit knowledge was shared amongst the audience (i.e. other stakeholders) whereas the back stage was an area in which individual stakeholders were able to store their personalised tacit knowledge. Like a performance, the tacit knowledge can be called up to the front stage during a scene (an event during the defects inspection process) and shared. Once a scene had been completed, the knowledge (both existing and new) will return to the back stage area awaiting its next roll call.

It was observed that experienced stakeholders (Colin and Alan) although having a big role to play on the font stage, tended to have a greater back stage presence. From here, the more experienced stakeholders were able to control the performance by being selective in what information they would send forward. This was clearly
demonstrated through Colin’s stories, ‘picking out patchy paintwork’ and ‘kicking the carpet’ stories (see Sections 5.3.2 and 5.3.3) in which he was able to control the outcome of a what the builders deemed to be defective items through the use of his tacit knowledge. The sharing of this knowledge would often be selective and elaborated upon only when specifically requested or questioned by the other stakeholders.

In contrast, less experienced stakeholders (George and Lisa) were thrust onto the front stage where they relied upon ‘the script’ (explicit forms of documentation) to complete their performance. It was through the continued performances (inspection sessions) in which the researcher noted that George and Lisa were able to make less use of ‘the script’ and greater use of their tacit knowledge (see Sections 5.5 and 5.9).

5.12 The Use of Tacit Knowledge to Manage and Share Information Model

The processes of information management and solution development in the project relative to the use of tacit knowledge can be tentatively generalised and modelled based on the observations made. Figure 5-3 shows the processes in which the stakeholders made use of tacit knowledge to manage and share information as they completed the defects inspections for the building.

Figure 5-3: The process in which stakeholders made use of tacit knowledge to manage and share information
The process in which stakeholders made use of tacit knowledge to manage and share information could be seen as iterative and comprised four major stages. Stage 1 involves the stakeholders being exposed to the external environmental factors: experience, explicit knowledge and domain-specific knowledge as they are actively involved in the process of inspecting the building. The second stage involves the stakeholders socialising and internalising the newly acquired information and converting it into tacit knowledge where it will be stored until such time a trigger event (Stage 3) presents itself. The final stage (stage 4) involves stakeholders externalising the tacit knowledge they had socialised and internalised in Stage 2 back out to the external environment through verbal and explicit means.

5.12.1 Stage 1: Exposure to External Environmental Factors

The first stage in the process involves the stakeholders working within their natural setting to complete the defects inspection process. It is during this stage in which they are exposed to the external environmental factors of:

5.12.1.1 Experience:

This could be a combination of both their personal experiences and/or through the experiences of others. Their personal experiences may come from a wide range of sources which include:

- Their own life experiences in which they are able to adapt to meet the needs of the defects inspection process and;

- The experiences that have resulted from working in the construction industry i.e. working on past projects in which they were a part of a defects inspection team.

Apart from the personal experiences, stakeholders are also exposed to the experiences of others.

5.12.1.2 Explicit Knowledge:

This involves the exposure to different forms of explicit documentation available to the stakeholders during the defects inspection process. These include access to items such as: books, manuals, schedules, files, drawings and emails.
5.12.1.3 Domain-specific Knowledge

Domain-specific knowledge refers to the valid knowledge that a stakeholder possesses within their specialised discipline. Within the context of this study, this knowledge can be a result of their education (both formal and informal), their experiences with the construction industry and/or through the access of explicit forms of documentation as books, manuals, schedules, files, drawings and emails.

It was through a combination of these factors and the ability of the stakeholder to make sense of the information which allowed them to move forward onto the next stage where it would be converted to tacit knowledge.

5.12.2 Stage 2: Socialisation and Internalisation

According to Nonaka’s (1994) SECI model of knowledge dimensions, there are four basic patterns involved in the creation of knowledge - each existing within a spiral (see Figure 5-4). When these patterns overlap, thought processes people use to acquire tacit knowledge alternate between two or more of these patterns.

Figure 5-4: Nonaka’s SECI model of knowledge dimensions (Nonaka, 1994 p. 16)
The second stage involves stakeholders converting the external environmental factors identified in Stage 1 into their own tacit knowledge. According to Nonaka (1994), this can be achieved through the dimensions of socialisation and internalisation.

Nonaka’s (1994) dimension of socialisation explains social interaction as tacit-to-tacit transfer. It is shared through face-to-face interactions in which stakeholders are able to learn through observing, imitating and practicing with others. Since tacit knowledge is difficult to formalise and often time and space specific, it is assumed that tacit knowledge can only be acquired through shared experience, such as spending time together or living in the same environment. Whereas Nonaka’s (1994) dimension of internalisation explains the transfer of knowledge from the explicit to tacit. This dimension involves the stakeholder reframing and interpreting explicit knowledge through the use of their own frame of reference so that knowledge can be understood and then internalised or accepted by others. Nonaka (1994) also suggests that tacit knowledge does not become part of the stakeholder’s knowledge base until it is articulated and internalised.

Once stakeholders have gone through the process of internalisation, it is suggested that the tacit knowledge will now reside within them until such time as a trigger event presents itself.

5.12.3 Stage 3: Trigger Event

As described in Stage 2, the tacit knowledge has now been internalised by the stakeholder until such time as a trigger event presented itself. The trigger event may present itself in many forms such as: someone asking them a question, or there is a situation that arises that is similar to what they have experienced. Once an event has been triggered, the stakeholder will then tap back into what they had previously stored as tacit knowledge and share the information/knowledge to the external environment.

5.12.4 Stage 4: Socialisation and Externalisation

As mentioned in Stage 3, once an event has been triggered, the stakeholder will then share the information/knowledge they had internalised back out to the external
environment. According to Nonaka (1994) this can be done through the dimensions of socialisation (see Stage 2) and externalisation. Nonaka’s (1994) dimension of externalisation explains the transfer of knowledge from the tacit to the explicit. It involves stakeholders being able to record discussions, descriptions and innovation in the form of explicit documentation such as books or manuals.

Once the stakeholder is able to externalise their tacit knowledge, it may be converted back to any one of the external factors listed in Stage 1 and hence, the cycle begins again.

5.13 Summary

The research shows that each stakeholder dealt with the use of tacit knowledge differently (see Table 5.1) according to their experiences, domain-specific knowledge and their reliance on explicit forms of documentation (explicit knowledge). During the study, the researcher observed that stakeholders who possessed a greater amount of experience (Colin and Alan) would often rely more upon the use of tacit knowledge to manage and share information. This could be attributed to the fact that they were able to make use of their tacit knowledge as a point of reference whilst conducting the on-site inspections whereas those who were less experienced tended to make reference to explicit forms of documentation such as the drawings and schedules.

Where conflict would arise, such as a debate over a defect (see Sections 5.3.2 and 5.7.3), experienced stakeholders such as Colin and Alan would often take charge and make the final decision. It was observed that they would both present their views on the issue by physically pointing it out and then use their tacit knowledge to ultimately influence the remaining members of the defects inspection team. Whereas, less experienced stakeholders (George and Lisa) tended to resolve conflict though the use of explicit forms of documentation (see Section 5.5.2). This enabled them to substantiate their arguments with formalised documentation that could not be refuted.

The use of tacit knowledge by the stakeholders to manage and share information during the defects inspection process could be represented via Goffman’s (1959)
dramaturgical perspective (see Section 5.11). Through this perspective, stakeholders could be seen as actors in a performance (defects inspection process) with explicit and selected tacit knowledge being shared with the audience on the front stage, whereas the back stage area was where individual stakeholders were able to store their personalised tacit knowledge. Although experienced stakeholders (Colin and Alan) had big roles to fill on the front stage, they tended to have a greater back stage presence where they were able to control the performance by being selective of what information (tacit knowledge) they would share and send forth.

Through the observations made by the researcher and Nonaka’s (1994) SECI model of knowledge dimensions, a tentatively generalised model was developed which demonstrated the stakeholders’ use of tacit knowledge to manage and share information (see Section 5.12). The model can be seen as an iterative process that is comprised of four major stages: Stage 1 involved the stakeholders being exposed to the external environmental factors of experience, explicit knowledge and domain-specific knowledge. Stage 2 involved the socialisation and internalisation of the factors in Stage 1 in order to convert it into tacit knowledge. Stage 3 represented a trigger event that allowed the stakeholder to tap back into their tacit knowledge. Finally, Stage 4 whereby stakeholders used the process of socialisation and externalisation to transfer the tacit knowledge back into an explicit form. Once the stakeholder is able to externalise their tacit knowledge, the process may begin again.

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<thead>
<tr>
<th>Stakeholder</th>
<th>Management of information</th>
<th>Sharing of information</th>
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<tbody>
<tr>
<td>Colin</td>
<td>Although Colin was seen carrying around a personal notebook and a copy of the drawings, it was observed that he often relied upon his tacit knowledge to manage the information during the defects inspection process (see Sections 5.3 and 5.4).</td>
<td>Colin’s preference for sharing information was through verbal forms of communication. The information he possessed was often internalised and not freely shared unless a similar event presented itself or questioned by another stakeholder (see Sections 5.3 and 5.4).</td>
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<tr>
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<th>Sharing of information</th>
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<tr>
<td>George</td>
<td>George’s management of information was initially reliant on explicit forms of documentation in which he would be constantly checking the defects inspection lists, schedules and recording defects in his personal notebook. As the inspection process progressed, it was observed that George was able to make use of his tacit knowledge to both assist and speed up the process (see Sections 5.5 and 5.6).</td>
<td>George’s preference for sharing information was through explicit forms of documentation. It was observed that he would take personal notes whilst completing the defects inspections and then return back to his office to type it up in order to share it with the other stakeholders involved in the process (see Sections 5.5 and 5.6).</td>
</tr>
<tr>
<td>Alan</td>
<td>As described in Section 5.7, Alan did not rely upon the explicit forms of documentation available to him. Instead, he would make use of his tacit knowledge to manage the information during the defects inspections.</td>
<td>Similar to that of Colin, Alan tended to make use of verbal forms of communication to share information. This information was often internalised and not freely shared unless a similar event presented itself or it was specifically requested by another stakeholder (see Sections 5.7 and 5.8).</td>
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<tr>
<td>Lisa</td>
<td>Due to the nature of Lisa’s role, information was often managed through explicit forms of documentation such as the defects inspections lists and schedules. However, as the process progressed, It was observed that Lisa was able to make use of the tacit knowledge she had obtained to assist her with the completion of the explicit forms of documentation (see Sections 5.9 and 5.10).</td>
<td>Once again, due to the nature of Lisa’s role, information was often shared via explicit forms of documentation such as drawings, schedules and defect inspection lists (see Sections 5.9 and 5.10).</td>
</tr>
</tbody>
</table>

Table 5-1: A summary of how each stakeholder made use of tacit knowledge to manage and share information

The following chapter explores the stakeholders’ use of tacit knowledge to manage and share information during the defects inspection process. The findings from this chapter drew upon data that was collected from a variety of sources such as on-site observations, document collection and interviews. The next chapter (Chapter Six) will present and discuss the stakeholders’ use of explicit knowledge to manage and share information during the defects inspection process.
6 The Use of Explicit Knowledge in the Management and Sharing of Information within the Defects Inspection Process

6.1 Introduction

This chapter will present the research findings in relation to the stakeholders’ use of explicit knowledge in the management and sharing of information within the defects inspection process. The primary focus of the chapter will be on the stakeholders’ information management and sharing practices rather than on an examination of their existing knowledge management practices. The findings from this chapter drew upon data that was collected from a variety of sources such as on-site observation sessions, document collection and interviews (see Chapter 3.5). Specific examples will be provided in terms of how stakeholders made use of their tacit knowledge through a series of vignettes (Stake 1985) (represented in grey boxes) and direct quotes in order to demonstrate how these factors were often overlapping and dependant on one another.

6.2 The Role of Explicit Knowledge in the Management and Sharing of Information

Smith (2001) defines explicit knowledge as ‘academic knowledge or “know-what” that is described in formal language, print or electronic media, often based on established work processes, use people-to-document approach’ (Smith 2001, p. 314). Explicit knowledge can be seen as technical, and in order to comprehend and make use of it, a level of academic knowledge or understanding that is gained via formal education or structured study is required. It differs from tacit knowledge as it is carefully codified, stored in a hierarchy of databases and can be accessed through high quality, reliable, and fast information retrieval systems. Upon codification, explicit knowledge assets can be reused to solve problems which display a similar nature or facilitate the connection of people with valuable, reusable knowledge (Smith 2001).
The following sections will explore the role of explicit knowledge in the management and the sharing of information during the defects inspection process in the building project studied. Data from the case study is presented first in the form of vignettes then later substantiated through the extraction of specific quotes as a result of conducting the follow-up interviews.

6.3 Colin’s Stories:

The following section will explore Colin’s use of explicit knowledge to manage and share information during the defects inspection process through a series of exemplar stories.

6.3.1 Story 1 – ‘These Might Come in Handy…’

It was during the first observation session in which the researcher observed Colin’s use of explicit knowledge. As this was the first observation session, the researcher had organised to meet Colin at his office in order for him to brief the researcher on the inspection procedures and provide access to the construction site. Upon arrival at Colin’s office, the researcher was made to wait at reception as a meeting that he was involved in was running overtime. With fifteen minutes to go before the scheduled inspection with the builders, Colin was seen rushing out of the meeting room and headed towards his desk where he would pick up his personal notebook and a copy of the drawings. Apologising for his lateness, Colin suggested he would brief the researcher on the walk down to the construction site. During the walk, Colin described what he typically did during a defects inspections session and noted that they often differed depending on the construction company he worked with. He then proceeded to point at the drawings and stated, ‘these might come in handy today’. Curious, the researcher questioned him to why this was the case and he stated ‘I’ll need to refer to these as I haven’t been inside the building since lock-up stage’. After formal introductions to the builders, a quick briefing in relation to the project status and a safety briefing, the defects inspection team (Colin, Alan, Lisa and the Project Manager) proceeded to begin the inspections. For the duration of session, the researcher noted Colin made use of the drawings as a map, allowing him to navigate his way from one space to the other. He would also use it as a
reference point where he was able to point out specific information to the builders such as the location of the whiteboard within a classroom.

6.3.2 Story 2 – ‘The Numbering Dilemma’

It was during the fifth observation session in which the researcher observed Colin’s use of explicit knowledge once more. The session revolved around Alan and Lisa in conjunction with Colin inspecting the office spaces on level six. As Colin was running late he was told via a text message to meet the builders in office space 6.30. Upon entering the building, Colin proceeded to what he thought was office space 6.30 and noticed that the builders were not there. He then checked his drawings once more to make sure he was in the correct space. After reassuring himself that he was in the correct space, he decided to give Alan a call to see where he was. Alan responded by stating that both he and Lisa were in office space 6.30 awaiting him. Both parties soon realised that they had different versions of drawings and that the numbering system had been updated a few days earlier to meet the existing numbering system that was adopted by the clients in their other buildings. Upon further examination, it was identified that Colin had printed his copy of the drawings before the updates were applied and hence possessed an out-dated version.

6.4 Colin’s Interview Responses:

The following section explores Colin’s use of explicit knowledge in order to manage and share information. The analysis is a direct result of both the on-site informal interviews and the formal follow-up interviews conducted with Colin and the other stakeholders at the conclusion of the defects inspection process.

It was often observed that during the defect (see Chapter 1.1) inspections, junior architects and builders would rely more upon the use of explicit knowledge such as the drawings or any other form of documentation. Whereas experienced architects and builders would often rely on their tacit knowledge to manage and share information during the defects inspection process (see Chapter 5.2). In order to substantiate these observations, subsequent follow-up interviews were conducted with stakeholders.
In response to a question that was posed in relation to the explicit forms of documentation and their use during the defects inspection process Colin stated:

We [the architects] always like to think in this office that the standard of documentation we do send out is very good. I’ll actually say that it is because I’ve worked in a few other places and actually the quality of the stuff that comes out of here is really good. Some offices you’d find half of the details that we draw they wouldn’t even bother to do. But then when you’re doing reasonably complex building you have to detail it properly. You know, you’ve got to do the detailing otherwise the building just, you know, can’t work and then you spend a lot of time trying to figure those things out. So, you know, I did use the documents more than I usually do.

The statement above suggests that, due to the complex nature of the building, detailed forms of explicit documentation needed to be produced. Without it, much time would be spent trying to figure out how the building was to be constructed and if what was being built actually met the architects’ overall vision. The statement also suggests that due to the quality and detail of the documentation on this particular project, Colin was more inclined to make use of the explicit forms of documentation to manage and share information during the defects inspection stage.

In order to further explore the frequency with which Colin made use of explicit knowledge, Colin was questioned in relation to how often he would refer back to the explicit forms of documentation such as lists, schedules and drawings. To this he responded:

Well… that’s a hard question, it depends on what we were defecting. You know, each session was different, some harder than others… I’d only really check the documents when something was new, like, you know, something that I hadn’t seen before, or I couldn’t remember something you know. But as I said before, I did check the documents more often than I did on previous jobs.

The statement provided above by Colin in conjunction with the researcher’s observations suggests that his use of explicit forms of documentation varied during the defects inspection process. It would only be referred to on occasions with which Colin was unfamiliar, or to help him deal with the amount of detail presented to
him due to the complexity of the building. Colin also noted that on this particular project he did make greater use of explicit forms of documentation to manage and share information.

In order to verify that both the data being provided by Colin and the on-site observation sessions were accurate, the outcomes of the analysis were also cross-referenced against data collected from the builders. When Alan was questioned in relation to Colin’s use of explicit knowledge during the defects inspection process, he responded:

Yeah, he [Colin] didn’t really check the documentation as much as George did, he kind of went off what he knew, you know. From what I noticed, he only checked them when he really needed to… and that wasn’t often.

Alan’s statement indicated that Colin did make use of explicit forms of documentation, however, this was seen as secondary to his use of tacit knowledge to manage and share information during the inspection process. Alan’s statement was also consistent with what Colin had previously stated in which he would refer to explicit forms of documentation only on occasions he was unfamiliar with, or to assist with the amount of complex building detail presented to him.

When Lisa was asked the same question in relation to Colin’s use of explicit knowledge, Lisa responded:

Come to think of it, he [Colin] didn’t really refer back to any of the documentation, and when he did, I think he relied on the documentation which I’d carried around.

The statement above provided by Lisa once again suggested that Colin had a strong preference towards making use of his tacit knowledge to manage and share information. However, what was interesting was that the statement also suggested that whilst on-site, Colin’s use of explicit forms of documentation was done via Lisa. Lisa was seen as the access point to the explicit forms of documentation used within the defects inspection process.

Through the researcher’s observations and examination of the interview data, it is suggested that Colin’s use of explicit knowledge played a secondary role to his use
of tacit knowledge to manage and share information. Follow-up interviews with Colin revealed that the architectural practice where he worked was able to produce explicit forms of documentation (drawings and schedules) that contained a greater level of quality and detail. As a direct result, Colin was more inclined to make use of it to deal with the level of complexity and detail associated with the building. The interview with Lisa also suggested that whilst on-site Colin saw no need to carry around duplicate forms of explicit documentation. Instead, Colin made use of Lisa as an access point to obtain the information required to make his decision. With respect to his information sharing practices, it was observed that Colin tended to make use of explicit forms of documentation (especially the drawings) to point out specific information to the other stakeholders present.

6.5 George’s Stories:

The following section will explore George’s use of explicit knowledge to manage and share information during the defects inspection process through a series of exemplar stories.

6.5.1 Story 1 – ‘I Am a Documentation Architect!’

As mention in Chapter 3.4.1.2, George classifies himself a ‘documentation architect’. His initial role within this construction project was to document the specifications for the building. However, as Colin took six weeks leave to visit family overseas, George was required to assume his role in inspecting the building. As this was the first session in which the researcher would observe George, and in order to keep things consistent with Colin, the researcher decided to catch-up with George at his office - forty-five minutes before the commencement of the on-site inspections with the builders. Upon arrival at the architectural practice, the researcher noticed that George had already gathered his things and was ready to go. George then approached the researcher and said ‘How about we go downstairs and get a coffee so I can go through this documentation?’ As the researcher and George waited for their coffees, the researcher asked about George’s involvement in the project to which he responded: ‘On this project, I am the documentation architect, I basically prepared the finishing schedules for the building’. George then
proceeded to unzip his bag to reveal a set of documentation which included a copy of the drawings, the defects (see Chapter 1.1) inspection list which Lisa had sent previously, his personal notebook and the building schedules. It was soon after this that the researcher first observed George’s use of explicit knowledge during the defects (see Chapter 1.1) inspection process. From the set of documentation, George selected the defects inspection list and began to go through each item one-by-one, placing a star next to the items about which he required further clarification. Typical items he placed a star next to were items where the builders might not have provided enough description, or the description was unclear. It was then observed that George would use this annotated defects list as one of his main reference points during the defects inspections sessions.

6.5.2 Story 2 – ‘I’ll Get Back to You…’

It was the fourteenth observation session during which the researcher observed George’s reliance on explicit knowledge once more. This was the second session in which George was involved and revolved around inspecting the classroom spaces on level five. Upon entering classroom space 5.11, Lisa began to load the IDMS on her tablet and go through the pre-identified defects (see Chapter 1.1) one-by-one. As she was reading aloud the items, George cross-referenced them against the copy Lisa had sent him the previous day. About half way through the inspection of the classroom space Lisa brought up a question in relation to the finishing of the door handles. Lisa asked George if he knew if the door handles should have been finished off in a matte finish like the ones in the office spaces, or finished off in chrome as installed. George then opened his backpack and pulled out the finisher schedule (a document that specifies the finishes to be applied to a space). After checking the finisher schedule George responded by stating ‘um, it’s not on my finisher schedule, I think they need to be a matte finish... um... I’ll get back to you’. The researcher then noted that George recorded the issue in his personal notebook and continued on with the defects inspections. During subsequent inspections and after checking with the schedules back at the office, George did confirm that the door handles in the classroom spaces were installed incorrectly, they needed to be finished off in chrome rather than the matte finish as he first suggested.
6.5.3 Story 3 – ‘Lockable Cupboards…’

The seventeenth observation session was another in which George demonstrated his reliance on explicit knowledge. This session revolved around Alan and Lisa in conjunction with George inspecting the student spaces on level six. As this was a small space to defect, the inspection team finished it ahead of schedule and decided to continue and inspect the adjacent office spaces. As they entered the space Alan noticed that the lockable cupboards were not placed in a consistent manner as they were on the previous levels. Alan noticed that in some areas they were next to each other and in others they were separated by bookshelves. He then turned around and asked George if this was done according to the plans and to this he answered ‘I don’t have a copy of the plans... I just don’t know... I’ll check up on that when I get back to the office’. George once again jotted this down into his personal notebook for chasing up afterwards. During subsequent inspections and after checking with the plans back at the office, George did confirm that the lockable cupboards needed to be next to each other with the bookshelves on either side.
Figure 6-1: The lockable cupboards
6.6 George’s Interview Responses:

The following section explores George’s use of explicit knowledge in order to manage and share information. The analysis is a direct result of both the on-site informal interviews and the formal follow-up interviews conducted with George and the other stakeholders at the conclusion of the defects inspection process.

Throughout the duration of the defects inspection process, the researcher observed that George had more of a preference towards the use of explicit forms of documentation to assist him with the management and sharing of information during the defects inspection process. In order to substantiate these observations, subsequent follow-up interviews were conducted with George. In response to a question posed in relation to his use of explicit forms of documentation throughout the defects inspection process, he replied:

*It’s very important to always carry the drawings and schedules for specification with you so that you are able to answer any questions otherwise you cannot answer any questions that come at you...and on a complex project such as this one, there were many questions asked along the way. It also helps when you see them [builders and their contractors] doing something on-site and you think that doesn’t look right you usually go back and check the drawings and you’ll sort of say oh, no, I think you’ve put that in the wrong spot.*

In addition to making reference to the explicit forms of documentation in order to resolve any queries that may have arisen, George also commented on the fact that through its use, he was able to deal with the volume of information presented before him by stating:

*You know there’s a lot of information involved, for example when you deal with finishes, you deal not only with the colour, you need to know which type of paint, you need to know the gloss level, you need to know ... you know there are many, many details, items, that you need to know to fully remember everything so it’s very hard to ... I would be ... I’m probably not able to fully ... actually when I get asked something that relates to such detailed*
information I am more secure if I say look, I’ll look it up for you, I’ll find it and I know where I can find it.

George then continued on and explained that through the use of explicit forms of documentation, he was provided with the opportunity to share accurate information amongst his colleagues as well as making sure that everything was compliant with Australian standards. He did so by stating:

_I don’t like to run the risk of maybe forgetting one little detail when I explain something to a colleague who is dealing with the same issue, I don’t want to tell anyone anything that is not 100% right so I better look it up, so... but that’s very detailed stuff... these were items in which we dealt with a couple of times a month, and when they did come up, I’d check them against the Australian standards... at the end of the day, we needed to be compliant with the Australian standard because that’s the law._

The statements provided above by George in conjunction with the researcher’s observations indicated his reliance on explicit forms of documentation to manage and share information. George’s statements suggest that he made use of the documentation as a point of reference, offering him a sense of security in being able to provide both himself and the other stakeholders the assurance that the information he shared was from an authoritative source. George’s use of explicit forms of documentation also assisted him in resolution of any issues or conflicts that had arisen as a result of conducting the inspections as it is often harder to dispute something that was in writing and formalised. Finally, the statements also suggest that, similar to that of Colin, the use of explicit forms of documentation assisted George in dealing with the amount of detail presented to him due to the complexity of the building.

In order to further explore the frequency with which George made use of explicit knowledge, George was questioned in relation to how often he would refer back to the explicit forms of documentation such as lists, schedules and drawings. To this he responded, ‘Very often... I always try to take the finisher schedule and drawings with me when I go to site’. This statement suggests that, unlike Colin whose use of explicit forms of documentation varied between inspection sessions, George
preferred to make use of it in a constant manner being able to refer back to it as often as possible.

In order to verify the data that was being provided by George and that the on-site observation sessions were accurate, the outcomes of the analysis were also cross-referenced against data collected from the builders. When Alan was questioned in relation to Colin’s use of explicit knowledge during the defects inspection process, he responded, ‘He did all the documentation and then got to the building and went oh, ok, and so he had to rely on the documentation model’.

Alan’s statement alluded to the fact that there is a difference in terms of what was documented and what actually eventuated on-site. In this particular instance, Alan suggests that, because George was involved in the documentation of the building, he came into the defects inspection with a documentation-orientated mindset. After being on-site George realised that the situation was different and out of his comfort zone, hence reverted back to what he was most familiar with, which was making use of the explicit forms of documentation to manage and share information.

When Lisa was asked the same question in relation to Colin’s use of explicit knowledge, Lisa responded, ‘He [Colin] knew a bit about joinery and finishes so he could recall quite a bit but sometimes he’d be like, “I just don’t have a plan, I don’t know”.’

The statements provided above by Lisa confirmed both George’s own statements and the observations made by the researcher. They indicated that although George did possess both tacit and specific domain knowledge, there were still gaps where he relied upon explicit forms of documentation to manage and share information.

Through the researcher’s observations and examination of the interview data, it is suggested that George’s use of explicit knowledge played a pivotal role in his management and sharing of information during the defects inspection process. Follow-up interviews with George revealed that he would often make use of explicit forms of documentation as a point of reference which enabled him to: (a) feel a sense of security; (b) assist with the resolution of issues or conflicts that may have arisen whilst conducting the defects inspections; and (c) deal with the amount of detail presented due to the complexity of the building. With respect to his
information sharing practices, it was observed that George tended to make use of explicit forms of documentation in order to make sure that he was disseminating the correct information at all times.

### 6.7 Alan’s Stories:

The following section will explore Alan’s use of explicit knowledge to manage and share information during the defects inspection process through a series of exemplar stories.

#### 6.7.1 Story 1 – ‘Pinning it down’

During the twenty-fourth observation session the researcher observed Alan’s use of explicit knowledge to manage and share information. As this was the second session in which the defects inspection team had separated into two groups, Alan assumed documentation duties as Lisa was busy inspecting other parts of the building. Prior to the session beginning, the researcher observed Alan logging onto the IDMS and obtaining a printout of the defects identified for the Level 10 spaces. Upon commencing the inspections, the researcher noted Alan made use of this list as the main source of reference. To this list, he applied a ‘ticks, crosses and circles’ system where rectified items were given a tick, unrectified items were given a cross and items of which he was unsure, or required further clarification, were identified by circling the defect number. On competition of the inspections the researcher observed Alan heading back into his office where, depending on the item in question, he made use of a variety of resources to assist him with the clarification of defects. It was noted that Alan’s first point of reference would always be Lisa as she was responsible for the lists. And if he could not obtain clarification from her, he would then refer to the explicit forms of documentation. During this particular inspection session, Alan was unsure about the height of the pin boards located in the office spaces on Level 10, and after checking to see if Colin knew anything about it, or had the appropriate documentation, he could not resolve his query. He then headed back to the office where he caught up with Lisa. Here they would sit down at his desk and exchange queries that had arisen from completing the separate inspections. Lisa could not answer Alan’s query and suggested he either email the
architects or obtain a copy of the detailed drawings from the ACONEX system. As timing was critical on this construction project, Alan was then seen quickly logging into the ACONEX system where he downloaded the latest copy of the detailed drawings.

### 6.7.2 Story 2 – ‘Flat or semi-gloss?’

It was the twenty-fifth observation during which the researcher observed another instance where Alan made use of explicit forms of documentation. The session revolved around Colin and Alan inspecting the office spaces on Level 10. During the middle of the inspection, Alan was approached by a painter who required clarification of the type of paint finish underneath the benches outside the classrooms spaces. The painter made reference to the email conversations they had the week before in which they were going to change the finish from flat to semi-gloss. The painter mention that a semi-gloss finish tended to be more durable and could withstand the scuff marks caused by the heels of the shoes rubbing against it. Alan then responded by stating that he could not remember the full details of the email conversation and would check the ACONEX system (a system in which all correspondence for the building is captured) when he got back into the office. Upon completion of the inspection session, the researcher followed Alan back to his office where he witnessed Alan log into the ACONEX system and search for the correspondence between himself and the painter. Alan then verified that the decision had been made to change the paint finish from flat to semi-gloss and proceed to email the painting firm so they would have it in writing and then call the painter directly to let him know the outcome.

### 6.8 Alan’s Interview Responses:

The following section explores Alan’s use of explicit knowledge in order to manage and share information. The analysis is a direct result of both the on-site informal interviews and the formal follow-up interviews conducted with Alan and the other stakeholders at the conclusion of the defects inspection process.

Although it was observed that Alan tended to rely on his tacit knowledge, there were occasions in which the researcher observed him making use of explicit forms
of documentation to manage and share information, especially when he and Lisa completed separate inspection sessions. In order to substantiate these observations, subsequent follow-up interviews were conducted with Alan. In response to a question posed in relation to how he managed the defects inspection process when the teams were separated he replied:

*You know, the process didn’t really change much. Obviously without her [Lisa] around, someone had to take over and be in charge of the lists... because there was only the two of us [Alan and Colin] you know, and we [the builders] like to take control, it was left to me. So when it was just Colin and I, I had to make sure that I brought the lists along or else we’d have no idea of which defects to check.*

The statement provided above by Alan suggests that although the defects inspection team was separated, the overall process of inspecting the building remained constant. Alan’s statements also alluded to the fact that, due to Lisa’s absence, there needed to be a change in role. Alan now was seen as the person in charge of the lists, and that it was now his responsibility to manage and share the information during this process.

Similar to that of Colin and George, in order to further explore the frequency in which Alan made use of explicit knowledge, Alan was questioned in relation to how often he would refer back to the explicit forms of documentation such as lists, schedules and drawings. To this he responded:

*Well... let me see... as I told you earlier because I am on site all day, I’m in the thick of it, you know. It’s too hard to carry around documents while trying to do other things, and if I do need to check something, I’ll make a note of it and check it later... and you know what? If it’s really urgent, I can always call the office.*

The statement provided by Alan above suggests that due to the nature of his role, it was difficult to carry around explicit forms of documentation. It also suggested that Alan made use of a priority system. Items he could not resolve on the spot and not deemed to be urgent were recorded through the notes section of his mobile phone. It was observed that items that required a quick resolution could be concluded
through the use of other points of reference such as calling the office or the examination of copies of drawings that the tradesmen had on-site.

The researcher then wished to explore the differences between Alan’s use of explicit forms of documentation during the separate inspections with Colin, and the combined sessions with the defects inspection team. In order to do so, Alan was asked to reflect upon the differences between the two. In his response to conducting the combined inspection sessions, Alan stated:

*When I was with the group, Lisa was in charge of the defects lists you know, she’d carry around the documents we needed, and if she didn’t, the architects did. My role was really to make sure that everything was running smoothly from our end and make sure that the tradies did their job.*

Whereas Alan’s response to conducting the defect inspection sessions with Colin was:

*Yeah, when Colin and I did them, I had to look after the lists you know, my role changed... so yeah you could say that I did have to make use of the documents more than I usually do.*

The statements suggest that due to the change in role, Alan was required to make adjustments in the way he made use of explicit forms of documentation to manage and share information. Whilst working in the team, and similar to that of Colin, it was observed that Alan tended to rely upon Lisa as an access point to the explicit forms of documentation. Whereas when the team separated, Alan was required to take charge of the documentation and hence his reliance on it increased.

In order to verify that accurate data was being provided by Alan and that the on-site observation sessions were correct, the findings were also cross-referenced against those of the Architects. When Colin was questioned in relation to the differences he observed in Alan making use of explicit forms of documentation during the combined inspections sessions in contrast to the inspections sessions conducted with him, he stated:

*Umm... let me think... when we [Colin, Alan and Lisa] did the inspections as a group, he [Alan] didn’t really check any of the documents you know. He*
didn’t really have to, we had Lisa doing that for us. Whereas when Alan and I did them together, I suppose he [Alan] had to check the documents... there was only the two of us you know. At the end of the day, it is the builder’s responsibility to make sure they deliver a building with the least amount of defects as possible.

The statement provided by Colin confirmed both the comments provided by Alan and the researcher’s own observations. They suggested that whilst conducting the inspections as a group, Alan made use of Lisa as a reference point to access explicit forms of documentation, whereas the inspection sessions conducted with Colin saw a shift in Alan’s role. He was no longer able to rely upon Lisa to manage and provide him with information from the lists and schedules. Instead, he was forced to do this himself.

Due to the fact that George did not complete individual inspections with Alan, the same question regarding the differences observed in Alan making use of explicit forms of documentation during the combined and individual sessions could not be asked. Therefore, Colin was asked to comment in relation to Alan’s reliance on explicit forms of documentation during the combined sessions. To this he responded, ‘As I told you before, I didn’t really notice him [Alan] carrying around any documents... It was normally Lisa or myself who carried them around’.

The statement provided by Colin confirms both the comments provided by Alan during follow-up interviews and the researcher’s observations. George’s comments suggest that during the combined inspection sessions, Alan tended not to make reference to explicit forms of documentation and if he did, it was achieved through querying the other stakeholders present.

Through the researcher’s observations and examination of the interview data, it is suggested that Alan’s use of explicit forms of documentation to manage and share information varied throughout the defects inspection process. Follow-up interviews with Alan and other stakeholders revealed that the shift in his role was a major factor in the way he made use of explicit forms of documentation. The statements he made during these interviews suggested that the environment in which he worked, outside of the defects inspections, made it difficult for him to carry and
make reference to explicit forms of documentation. Whilst working in the combined inspection team, Alan was able to make use of other stakeholders such as Lisa as a point of reference and through them, access explicit forms of documentation. Whereas when the defects inspection team was separated into two, Alan was required to take on the additional duties. He was now responsible for the documentation of the process which in turn increased his reliance on explicit forms of documentation to manage and share information. The research data also indicated that through the use of explicit forms of documentation, Alan was able to: (a) resolve issues or conflict as they arise; (b) deal with the amount detail due to the complexity of the building and; (c) control the defects inspection process i.e. use the defects inspection lists as the basis for leading an inspection session.

6.9 Lisa’s Stories:

The following section will explore Lisa’s use of explicit knowledge to manage and share information during the defects inspection process through a series of exemplar stories.

6.9.1 Story 1 – ‘Paperwork, Paperwork, Paperwork…’

Throughout the defects inspection process there were numerous times during which the researcher witnessed Lisa’s use of explicit knowledge to manage and share information. The first was straight after the researcher was formally introduced to Lisa. The session began with Colin and the researcher arriving at the construction site office to meet with the other stakeholders namely, the builders and project manager. After formal introductions and a safety briefing from Alan, the researcher observed Lisa heading back to her workstation and logging onto ANCONX and the IDMS. After a few minutes of engaging with the system Lisa proceeded towards the printer where she would collect four copies (twenty-six pages each) of items which the builders had previously identified as defects (See Appendix C) and four detailed copies of the drawings for level three. She then headed back to her desk and collected the tablet she would use during the on-site inspections. Upon commencement of the on-site inspections, the researcher noted that Lisa began to make use of the tablet to record the defects in order to share it later with the other
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stakeholders and the contractors involved in the rectification works. However, about a third of the way through, it was observed that the process became cumbersome and she was not able to keep up with the pace at which the others were inspecting the building, hence, she reverted to making use of a pen and the printouts she had created at the beginning of the session. At the completion of the session, the researcher observed Lisa returning back to her workstation where she manually transferred both the outcomes of the previously identified defects as well as any new identified defects into the IDMS.

6.9.2 Story 2 – ‘Creating and Sharing Lists…’

It was the second inspection during which the researcher witnessed Lisa’s use of explicit forms of documentation to manage and share information. The session began with the researcher arriving at the construction site office an hour before the scheduled inspection time to observe the process in which the builders prepared themselves. As Alan was busy dealing with an issue on-site, the researcher decided to spend time observing Lisa. After greeting Lisa, the researcher was then invited over to her workstation so that she could demonstrate the IDMS. Lisa explained that the IDMS was a system they used to manage defects and that every defect they identified was recorded into this system. She then went on to elaborate how the system could be used to generate different lists for different stakeholders associated with this project and this was exactly what she was currently doing. The researcher then queried her on why different lists needed to be created and she replied, ‘each person requires different bits of information, it doesn’t make sense if I send every single defect to the painters when all they need to know is what they need to do…’ The researcher then asked her if the same was done with the stakeholders involved in the defects inspection process; ‘yeah… so you end up generating at least four different lists for a single space that you defect… one for the architects, one for the project manager, one for the contractors and one for us… they don’t really differ much, just a few details here and there’. Lisa was then asked how these lists were disseminated to the parties involved, to this she responded: ‘it’s really easy, once IDMS generates the list I email them to the responsible parties, in fact I’ll show you now’. Lisa then proceeded to filter the master register list on the IDMS so that only...
items that were allocated to the painting firm were displayed. A copy of the list was saved and subsequently emailed to the painting firm.

6.9.3 Story 3 – ‘Let Me Check That For You…’

It was during the third observation session that the researcher observed Lisa’s use of explicit knowledge once more. This session revolved around Colin and Alan in conjunction with Lisa inspecting the flooring on level three. About half way through the session, Alan turned around and asked Lisa if the rust stains cause by the iron in the polished concrete floors was a recurring issue on all the levels, and if so, has it been recorded into the IDMS? Lisa then responded, ‘I don’t know… let me check that for you’. She then proceeded to enter a query into her tablet and responded, ‘yes, this has been recorded eighteen times across most of the levels’. It was also noted that for the remainder of the defects inspection process, Lisa often adopted this technique of checking her tablet to verify items in which she was unclear of, or required additional clarification.

6.10 Lisa’s Interview Responses:

The following section explores Lisa’s use of explicit knowledge in order to manage and share information. The analysis is a direct result of both the on-site informal interviews and the formal follow-up interviews conducted with Lisa and the other stakeholders at the conclusion of the defects inspection process.

Throughout the duration of the defects inspection process, the researcher observed that due to her inexperience and the role she performed, Lisa was much more reliant on explicit forms of documentation to manage and share information. In order to substantiate these observations, subsequent follow-up interviews were conducted with Lisa. In response to a question posed in relation to her use of explicit forms of documentation (lists, drawings and schedules) during the defects inspection process she responded, ‘They were an essential part of my job, I needed to make sure that the lists are up to date, sent out to the right people and so on’.

The statement provided by Lisa above indicates that, due to her role in the defects inspection process, Lisa was heavily reliant on the explicit forms of documentation to manage and share information. In order to further explore her use of explicit
forms of documentation, Lisa was asked to provide examples of how she would make use of these whilst conducting the on-site inspections. To this she responded:

_Sometimes the architects can be wrong because, well you know, there’s a misunderstanding between what is documented and what is agreed upon. We do a lot of marking up of drawings and verbal agreements and it is hard to keep track of the designs... so by me having the documentation helps resolve some of the issues we have._

Lisa then continued on and began to discuss the importance of making reference to the explicit forms of documentation by stating:

_Yeah, you might need to go back and have a look at a list or drawing... you might have said something to someone, but at the end of the day you need something in writing to back it up. It’s a way to cover your arse basically, so some … it’s … everybody uses it in a way to cover their liability, you told me to do this, so if you issue a formal site instruction for someone to do that and they do it and the cost … Well then they’ll ask for the money and you sent me a site instruction so it’s a way of covering everything._

The statements provided above suggests that Lisa made use of explicit forms of documentation to assist her in dealing with the issues that had arisen during the inspection sessions. Through their use, and similar to that of George, they provided her with a point of reference as well as offering her a sense of security allowing her to cover any liabilities that the builders may encounter. Lisa’s statements also alluded to the fact that her use of the explicit forms of documentation played a supporting role in her decisions against that of the other stakeholders.

In order to verify the data that was being provided by Lisa and that the on-site observation sessions were accurate, the findings were also cross-referenced against that of the architects. When Colin was questioned in relation to Lisa’s use of explicit forms of documentation during the defects inspection process, he responded:

_From what I saw she’d [Lisa] always carried around a copy of the defects list and drawings…and…oh yeah, and there was the tablet… She [Lisa] referred_
to them quite often, I suppose when you have to check through a million things, you need some way of managing it aye?

The statements provided by Colin above suggest that Lisa both carried and relied upon explicit forms of documentation to manage and share information. It was also suggested that in doing so, it allowed her to deal with the amount of information produced due to the complexity of the building.

When George was asked the same question in relation to Lisa’s use of explicit forms of documentation during the defects inspection process, George responded, ‘I don’t think I ever saw her [Lisa] without a piece of documentation in her hands, she was a bit like me… we like to carry around documents’. He continued, ‘She [Lisa] was in charge of the lists, updating them and stuff… that’s what she did’.

The statements provided by George on Lisa confirmed both the researcher’s observations and the statements made by Lisa. The statements suggest that due to the nature of her role, Lisa was reliant on explicit forms of documentation to complete her tasks. In order to further explore this issue, George was then asked to comment on any differences in Lisa’s use of explicit forms of documentation whilst conducting the individual inspection sessions with him. To this he responded, ‘I don’t think there were any major differences in the way she [Lisa] went about it… the only thing that I could think of is… she didn’t really need to double check the documents’.

George’s statement in relation to Lisa’s use of explicit forms of documentation during the individual sessions suggests that, even though she was no longer working within the combined team, her role remained constant. It also confirmed the observations and statements made in Section 5.2.7 that there was a shift in the way Lisa made use of tacit knowledge.

Through the researcher’s observations and examination of the interview data, it is suggested that Lisa’s role as a junior coordinator and her inexperience in conducting the defects inspections was a contributing factor in the way she made use of explicit forms of documentation to manage and share information. It was observed that during the defects inspection process, Lisa’s role heavily revolved around the creation, management and dissemination of the defects inspection lists. These were
often supplemented by other forms of explicit documentation, which included the drawings and schedules. Follow up-interviews with Lisa and other stakeholders revealed that the use of explicit forms of documentation allowed her to: (a) deal with the volume of information produced due to complexity of the building; (b) be used as a point of reference in order to resolve any issues or conflicts that had arisen; and (c) feel a sense of security, allowing her to cover any liabilities that the builders may encounter.

6.11 Nonaka’s SECI Model of Knowledge Dimensions

The stakeholder’s use of explicit knowledge to manage and share information during the defects inspection process could be demonstrated via Nonaka’s (1994) SECI Model of Knowledge Dimensions. According to this model, knowledge is continuously transferred, combined, and converted into different types of knowledge as users practice, interact and learn (Nonaka 1994). The model proposes four ways in which knowledge types can be combined and converted, showing how knowledge (and in this instance information) is shared and created within an organisation. Figures 6-2, 6-3, 6-4, 6-5 will address this in terms of the model’s explicit knowledge dimensions and provide specific examples of how each stakeholder made use of explicit knowledge to manage and share information. The tacit-to-tacit dimension will not be presented in this section as it was discussed in the previous chapter (Chapter 5).
Figure 6-2: Specific examples of how Colin made use of explicit knowledge to manage and share information

- Through the initial use of drawings as a map and reference point, Colin was able to internalise this information and convert it into tacit knowledge for use later on (see Sections 6.3.1 and 6.3.2).
- Colin was able to make use of the explicit forms of documentation to check up on items that he was unsure of. He was then able to convert this into tacit knowledge (see Section 6.4).
- The use of drawings and schedules to create the ‘design issues list’ (see Chapter 4.2.4).
- The use of his on-site notes to create his own defects inspection lists (see Chapters 8.4.1.1 and 8.4.4.4).
- The use of his tacit knowledge assisted Colin with identifying defects. This was then shared amongst the other stakeholders and recorded on the defects inspection lists, drawings and schedules (see Chapters 5.3.2 and 5.3.3).
Figure 6-3: Specific examples of how George made use of explicit knowledge to manage and share information

- George was able to make reference to the explicit forms of documentation to check-up on items that he was unsure of. He was then able to internalise this information and convert this into tacit knowledge for use later on (see Section 6.5.2, 6.5.3 and 6.6).
- Through working on the schedules, George was able to memorise certain finishes and convert this into tacit knowledge (see Section 6.6).
- George made use of his tacit knowledge to assist him with the identification of defects. This was externalised and shared amongst the other stakeholders where it would be recorded on the defects inspection lists, drawings and schedules (See Chapters 5.5.2, 5.5.3 and 5.6).
- Through the use of the schedules and drawings George was able to generate new information relating to the defects (see Section 6.5.1).
- George was able to transfer the notes he took on-site onto: the architects’ template used to record defects, the emails he sent to the builders and update the finishing schedules (see Chapters 8.4.2.1 and 8.4.2.4).
Figure 6-4: Specific examples of how Alan made use of explicit knowledge to manage and share information

- Alan was able to make reference to the explicit forms of documentation to check-up on items that he was unsure of. He was then able to internalise this information and convert this into tacit knowledge for user later on (see Sections 6.7.1, 6.9.3 and 6.10).

- Through the use of existing defects inspection lists, drawings and schedules, Alan was able to create a detailed set of list whilst conducting the on-site inspections (see Section 6.8 and Chapters 8.4.3.1 and 8.4.3.4).

- Alan was able to transfer the notes he had taken on-site via the defects inspection lists and mobile phone onto the IDMS and ACONEX systems (see Chapters 8.4.2.1 and 8.4.2.4).

- Alan made use of his tacit knowledge to assist him with the identification of defects. This was externalised and shared amongst the other stakeholders. During the externalisation process information was recorded via a variety of sources which included: the defects inspection lists, drawings, schedules, emails, IDMS and ACONEX systems (See Chapters 5.7.3 and 5.6).
Chapter Six: The Use of Explicit Knowledge in the Management and Sharing of Information within the Defects Inspection Process

Figure 6-5: Specific examples of how Alan made use of explicit knowledge to manage and share information

- Lisa’s primary role throughout the defects inspection process was to create and maintain explicit forms of documentation such as the defects inspection lists. Information was gathered from a wide range of explicit documentation to create this list which included: the drawings, her personal notebook, the schedules and lists complied by other stakeholders (see Chapters 4.2.1-4.2.9, 8.4.4.1 and Sections 6.9.1, 6.9.2, 6.9.3, 6.10).

- Lisa made use of her tacit knowledge to assist her with the identification of defects. This was externalised and shared amongst the other stakeholders where it would be recorded on the defects inspection lists, drawings and schedules (see Chapters 5.9.3 and 5.10).

- Lisa was able to make reference to the explicit forms of documentation to check-up on items that she was unsure of and to gain a better understanding of the defects inspection process. She was then able to internalise this information and convert this into tacit knowledge for user later on (see Sections 6.9.2, 6.9.3 and 6.8).
6.12 Summary

The research shows that, although each stakeholder dealt with the use of explicit forms of documentation (explicit knowledge) differently, there were also many similarities (see Table 6.1). It indicated that stakeholders would rely upon explicit forms of documentation in order to deal with the volume of information presented to them due to the complex nature of the building, and to ensure that they were able to protect themselves from any possible liabilities as a direct result of conducting the defects inspections. During the on-site observations sessions, the researcher primarily observed stakeholders making use of the defects inspection lists, drawings and schedules. There was limited reference to any other forms of explicit documentation such as design guidelines or the Australian building codes besides George’s reference in Section 6.6.

Stakeholders who possessed less experience (George and Lisa) tended to rely more upon the use of explicit forms of documentation to manage and share information. Its use enabled these stakeholders to feel a sense of security, being able to make reference to it in order to resolve any issues or conflicts as they arise. Whereas during the combined inspection sessions, it was observed that the more experienced stakeholders (Colin and Alan) tended to make less reference to explicit forms of documentation as they were able access this information via Lisa.

The research findings also highlighted that fact that the stakeholder’s role (in particular the builders) during the defects inspection process had a direct influence on the way in which they would make use of explicit forms of documentation to manage and share information (see Sections 6.7.1, 6.8, 6.9.1, 6.9.2, 6.9.3 and 6.10).

Nonaka’s (1994) SECI Model of knowledge dimensions was adopted to demonstrate the stakeholder’s use of explicit knowledge to manage and share information. The findings from this chapter in conjunction with Chapters Four, Five and as will be shown with Chapter Eight demonstrated how the knowledge (in this instance information) was continuously transferred, combined and converted into different types of knowledge as the stakeholders practiced, interacted and learnt from one another during the defects inspection process. Specific examples of how this was achieved by individual stakeholders was mapped (see Figures 6-2, 6-3, 6-4...
and 6-5) demonstrating the ways in which this knowledge (information) was combined, converted, shared and created amongst the stakeholders and their respective organisations.

<table>
<thead>
<tr>
<th>Stakeholder</th>
<th>Management of information</th>
<th>Sharing of information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colin</td>
<td>As described in Section 6.3.1, Colin’s use of explicit forms of documentation played a secondary role to that of his use of tacit knowledge. Whilst on-site, it was observed that Colin would only bring along a copy of the drawings and his personal notebook as he relied on Lisa as an access point to the other forms of explicit documentation (schedules and defects inspection lists).</td>
<td>Although Colin tended to share information via verbal forms of communication (see Chapter 5.2.2), it was observed that during the on-site defects inspections Colin made explicit forms of documentation (especially the drawings) a reference in order to deal with the complex nature of the building as well as to point out specific details to the other stakeholders present.</td>
</tr>
<tr>
<td>George</td>
<td>The researcher’s observations and follow-up interviews suggest that the explicit forms of documentation played a pivotal role in his management of the information. Whilst on-site, George was often observed making reference to the schedules, drawings and defects inspection lists to complete his tasks. If the correct information could not be sourced, George would then make of a note of it his personal notebook and return back to his office where he would seek further clarification from the other forms of explicit documentation which he possessed (see Sections 6.5.2, 6.5.3 and 6.6).</td>
<td>George had a strong preference towards the use of explicit forms of documentation to share information. It was observed that he would often carry around copies of the drawings, lists and schedules during the on-site defects inspection and make reference to them in order to make sure that he was disseminating correct information at all times. Whilst completing defects inspections, it was also noted that George would take personal notes in relation to defects and upon returning back to his office, type it up in order to share it amongst the other stakeholders involved in the process (see Chapter Eight).</td>
</tr>
</tbody>
</table>
Chapter Six: The Use of Explicit Knowledge in the Management and Sharing of Information within the Defects Inspection Process

<table>
<thead>
<tr>
<th>Stakeholder</th>
<th>Management of information</th>
<th>Sharing of information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alan</td>
<td>Alan’s use of explicit forms of documentation varied during the defects inspection process according to the role in which he performed. Whilst conducting the inspection with the combined team it was observed that he relied more upon his tacit knowledge and accessed explicit forms of documentation such as the drawings, schedules and defects inspection list via Lisa. Whereas when he conducted the separate defects inspections with Colin, Alan was required to take on more of a documentation role and rely more upon the explicit forms of documentation to complete his tasks.</td>
<td>As Alan’s role changed during the defects inspection process, so did the way in which he shared information. Whilst conducting the defects inspection with the combined team, Alan tended to share information via verbal means of communication (see Chapters 5.2.5.2 and 5.2.6). Whereas when he was required to conduct the separate defects inspections with Colin it was observed that he had an increased reliance on explicit forms of documentation in order to share information (see Sections 6.7.1, 6.7.2 and 6.8).</td>
</tr>
<tr>
<td>Lisa</td>
<td>Due to the nature of Lisa’s role within the defects inspection process, information was often managed through explicit forms of documentation such as the defect inspection lists, schedules and drawings (see Sections 6.9.1, 6.9.2, 6.9.3 and 6.10). The management of this information was done so via multiple tools (tablet and her notepad), applications (ACONEX and IDMS), and formats (electronic and physical hardcopy).</td>
<td>Similar to that of George, Lisa had a strong preference towards the use of explicit forms of documentation to share information. This could be attributed to her inexperience and to the fact that her role revolved around the creation, management and dissemination of the defects inspection lists to all parties involved including the contractors responsible for the rectification of the identified defects.</td>
</tr>
</tbody>
</table>

Table 6-1: A summary of how each stakeholder made use of explicit knowledge (explicit forms of documentation) to manage and share information

This chapter explored the stakeholders’ use of explicit knowledge (explicit forms of documentation) to manage and share information during the defects inspection...
process. The findings from this chapter drew upon data that was collected from a variety of sources such as: on-site observations, document collection and interviews. The next chapter will present and discuss the use of experience in the management and sharing of information during the defects inspection process.
7 The Use of Experience in the Management and Sharing of Information Within the Defects Inspection Process

7.1 Introduction

This chapter will present the research findings in relation to the stakeholders’ use of experience in the management and sharing of information within the defects inspection process. The findings from this chapter drew upon data that was collected from a variety of sources such as on-site observation sessions and interviews (see Chapter 3.5). Specific examples will be provided in terms of how stakeholders made use of their experience through a series of vignettes (Stake, 1985) (represented in grey boxes) and direct quotes in order to demonstrate how these factors were often overlapping and dependant on one another.

7.2 Experience

The Oxford English Dictionary (2013) defines experience as ‘the knowledge or skill acquired by a period of practical experience of something, especially that gained in a particular profession’. According to Josephson and Hammarlund (1999), stakeholders with limited experience in construction are more likely to be successful in the identification of defects during the inspection process as opposed to those who are more experienced. This can be attributed to the fact that stakeholders who possess a greater amount of experience tend to perceive some situations as being normal and for that reason, fail to record them as defects (Josephson & Hammarlund, 1999). Studies conducted by Odeh and Battaineh (2002), Assaf and Al-Hejji (2006) and Sambasivan and Soon (2007) suggest that one of the most important factors that cause delays within a construction project is inadequate contractor experience. Being a complex construction project, this factor was highlighted even further as the building was linked to strict contractual agreements which involved a set handover date.

The following sections will explore the stakeholders’ use of their experience in the management and sharing of information during the defects inspection process. Data
7.3 Colin’s Stories:

The following section will explore Colin’s use of his experience to manage and share information during the defects inspection process through a series of exemplar stories.

7.3.1 Story 1 – ‘A Systematic Way of Doing Things’

It was during the first observation session in which the researcher observed Colin’s use of his experience to manage and share information. This session revolved around the Project Manager, Alan and Lisa in conjunction with Colin defecting one of the major lecture theatres on level three.

Upon entering the lecture theatre, Colin was overheard saying:

> I don’t know how you guys usually do it, but with previous jobs we’d tick off all the items on the list then go back and look for new ones. We’d start with the floors, then move onto the walls and fixtures and we’d do the ceilings last… That way we’d have a systematic way of doing things.

The other stakeholders were then observed looking at one another nodding their heads in agreement with Alan stating: ‘yep that’s fine with us’.

7.3.2 Story 2 – ‘Glossy Plaster Finish’

It was during the fifth observation session that the researcher observed Colin’s use of his experience to assist him in sharing information. The session revolved around Alan and Lisa in conjunction with Colin defecting the office spaces on level six. Upon entering the space, Lisa noticed that the paintwork on the walls surrounding the tea point looked wavy and brought it to the attention of the other stakeholders. Colin then had a quick look and feel of the wall and responded, ‘nah, from my experience, there is nothing you can do… no matter how hard you try, when you get glossy paint on a white plaster wall you’re always going to get these waves’. Alan then also came over for a quick look and agreed. The item was subsequently
not recorded as a defect and a similar approach was taken with the tea points on the remaining levels.

7.3.3 Story 3 – ‘Missing Seals’

In the eleventh observation session the researcher observed Colin making use of his experience to manage and share information. The session revolved around Alan and Lisa in conjunction with Colin defecting the student commons on level five. Upon inspection of the commons, Colin noticed that the clear silicone caulk that was supposed to be used between the glass panels was missing. This would weaken the structure as well as allowing sound to escape from the enclosed area into the classroom beside it. Colin quickly dashed over to the adjacent student common where he discovered that it too was missing the clear silicone caulk. Colin then proceeded back to the other stakeholders where he notified them of his findings. Upon doing so, Lisa was instructed by Colin to record his findings as a bulk defect item in which every seal between the glass panels on level five needed to be rectified. When Alan questioned Colin to why this was the case, he responded by stating: ‘I’ve worked with these guys before [the glaziers], and from my experience, if these guys have missed the seals here, you’ll bet they’d missed the seals elsewhere’. Lisa subsequently recorded the missing seals as a bulk defect item for level five, which later on, turned out to be the correct decision as the inspections revealed that all of the glass panels were missing the clear silicone caulk.

7.4 Colin’s Interview Responses:

The following section explored Colin’s use of his experience in order to manage and share information. The analysis is a direct result of both the on-site informal interviews and the formal follow-up interviews conducted with Colin and the other stakeholders at the conclusion of the defects inspection process.

It was observed that during the defect inspections, senior architects and builders would often call upon their experience to assist them with the management and sharing of information. In order to substantiate these observations, subsequent follow-up interviews were conducted with the stakeholders.
When Colin was questioned in relation to the use of his experience and the role it played during the defects inspection process, he responded:

Yeah experience plays a vital role, the more [defects inspections] you do, the better you get at it... you know. Sometimes you can look at an object and think it looks horrible, but at the same time you know that it meets the standards and that the tradie has done the best he can... you’re simply not going to waste recording something and then arguing about it with the builders when you know you’re just going to lose.

Colin then continued on and elaborated on the need for experience:

What you’ve also got to be aware of is... and I suppose again that is something that comes with, you know, experience is that constructing things to what they look like at the end, they go through a process of while they’re being done they don’t always look like at the end. So inexperienced people would look at something and think that doesn’t look right but it actually is, because, you know, the end product could be different to what the process of building it is.

These responses suggested that Colin made use of his experience on a regular basis to assist him with the defect inspection process. In the first of his two responses, Colin alluded to the fact that his experience played a vital role in the inspection process and that through its use, he was able to reduce both the time taken to record the defects and the amount of conflict that may have arisen between the parties involved. The second of the two responses suggested that his experience also played an important factor in the judgement of defects. This experience became particularly useful on this project as the defects inspections were conducted in parallel with the fit-off stage (see Chapter 4.2). His experience allowed him to visualise the finalised product even though it was still under construction. This ultimately saved him and the team precious time, as they did not need to record and manage items that were in the process of being completed.

In order to verify that the data being provided by Colin and the on-site observation sessions were accurate, the outcomes of the analysis were also cross-referenced against data collected from the builders. When Alan was questioned in relation to
Colin’s use of his experience to manage and share information during the defects inspection process, he responded:

He [Colin] has been in this game for a long time now, he’s an old hand at it you know... he is much more experienced than I am and probably knows much better... like for example, a few weeks ago he taught me about paint. You’re supposed to look at paint from 1.5 metres... or in general you are supposed to look at defects from 1.5 metres... during the inspections he saw some people looking very closely at a particular area and pulled them away... we now follow that rule and it has saved us heaps of time.

The statement by Alan suggested that Colin possessed a wealth of experience and shared information with the others when the right situation presented itself (see Chapters 5.3 and 5.4). It also indicated that through his experience, Colin was able to speed up the process by eliminating items that would have normally been deemed as being defective by other, less experienced stakeholders.

When Lisa was asked the same question in relation to Colin’s use of his experience to manage and share information during the defects inspection process, Lisa responded:

He [Colin] is a very experienced operator and I learnt heaps off him... when I worked with George... he’s a good detailer and all but sometimes he’ll come up with an idea to solve an issue and you’ll be like that’s great but it’s going to cost a fortune, whereas Colin would make use of his experience and will be like, just do this, that’ll get rid of the problem... at the end of the day Colin’s experience saved us a lot of time, money and paperwork.

Lisa reinforced both the observations made by the researcher and the statement made by Alan. It suggested that although both architects performed the same role, it was ultimately Colin’s experience which assisted him in the decision making process. These decisions would ultimately result in less items being identified as defective, which, in turn, reduced the amount of information being created, managed and disseminated by both Colin and the builders.
Through the researcher’s observations and examination of the interview data, it was suggested that Colin’s use of his experience played a pivotal role in the management and sharing of information during the defects inspection process. By making use of it, Colin was able to: (a) reduce the amount of time spent recording items that would normally be identified as being defective, (b) visualise what items would look like before they were completed, (c) reduce the amount of conflict that may have arisen between the stakeholders and (d) transfer his experience to the other stakeholders by offering information in relation to conducting the defects inspection process.

7.5 George’s Stories:

The following section will explore George’s use of his experience to manage and share information during the defects inspection process through a series of exemplar stories.

7.5.1 Story 1 – ‘I Think We Need a System…’

It wasn’t until the third observation session with George that the researcher first observed his use of experience to manage and share information. The session revolved around Alan and Lisa, in conjunction with George inspecting the classroom spaces on Level 8. During the previous two sessions, George was observed taking an ad-hoc approach in which additional defective items were identified by jumping from one space to another. This often led to confusion and in some instances, missed items. However, after checking off all the items identified on the initial defects inspection list, George was overheard saying ‘I think we need some sort of system to detect the newer defects’. George then devised a system in which he would work from the entrance of a space and move in a clockwise manner checking the floors, walls and fixtures until he reached the starting point again. The ceiling spaces were then inspected last, just before they turned off the lights and exited.

7.5.2 Story 2 – ‘Rust Stains in the Cement’

It was during the twenty-fifth observation session that the researcher observed George making obvious use of his experience to manage and share information. The session involved Lisa and George inspecting the open spaces on Level 7. Upon
completing the inspection of items detailed on the defects inspection list, George returned to an area directly opposite to the escalators where he noticed a reddish-brown stain on the polished concrete floors. After closer inspection, he realised that oxidising of the steel present in the reinforced concrete caused the stain. George then turned around to Lisa and stated ‘I’ve seen this before, it’s going to take three or four treatments over a couple of weeks to get rid of the stain... you may want to record this one as an ongoing defect’.

### 7.5.3 Story 3 – ‘Cover-up’

During the twenty-seventh observation session the researcher observed George making use of his experience to manage and share information once more. The session involved Lisa and George inspecting the office spaces on Level 9. As they entered office space 9.45, Lisa pointed out some patchy paintwork to the east facing wall. George then came over to inspect Lisa’s findings in order to confirm that it was indeed a defect. However, after reviewing her findings, George quickly dismissed it as being a defect and stated ‘there’s no point in recording this as a defect. What will end up happening is that the whiteboard will be eventually installed over the top of that section so it won’t be seen anyway’.

### 7.6 George’s Interview Responses:

The following section explores George’s use of his experience in order to manage and share information. The analysis is a direct result of both the on-site informal interviews and the formal follow-up interviews conducted with George and the other stakeholders at the conclusion of the defects inspection process.

It was observed that as the defects inspection process progressed, George began to gain confidence and make use of both his prior experience and the new experience he gained as a direct result of conducting the defects inspections to manage and share information. In order to substantiate these observations, subsequent follow-up interviews were conducted with George. In response to a question posed in relation to how the use of experience supported him in the sharing and management of information during the defects inspection stage, George responded:
Yeah, experience played a big role in managing the information… over time or the more projects you’ve worked on… and especially if you have delivered you know, seen through to completion… the easier it gets, you know what to do, know what is a defect and what is not… you know, having that experience can save you time and money.

George then continued on, remarking on the speed of the inspection process:

*What the experience has taught me is that… when we do the inspections it’s too hard to note down everything that is happening… we move quite quickly through the spaces cause we only have a limited amount of time… that’s why I scribble down the notes on-site then get back to the office where I can spend a few more hours typing it up in detail.*

George suggested that although he was not as experienced as Colin in the defects inspection process, he did understand its importance in the management and sharing of information. The first of the two statements alluded to the fact that George saw experience as something that could be developed over a period of time through the completion of projects. Through its use, George was able to make the necessary judgements during the on-site inspection that could ultimately save everyone time and money. Whereas the second of the two statements indicated that the experience that George gained as a direct result of completing the inspections altered the way in which he managed and shared information. George realised that due to the time constraints placed upon the inspection sessions and the building, he was unable to record detailed notes. Instead this task was left until his return into the office.

In order to verify that the data being provided by George and the on-site observation sessions were accurate, the outcomes of the analysis were also cross-referenced against data collected from the builders. When Alan was questioned in relation to George’s use of his experience to manage and share information during the defects inspection process, he responded:

*Yeah, at the start things happened pretty slowly, I suppose we were working full steam ahead you know. We were trying desperately to complete the building… and when Colin went on leave, he [George] was thrown into the*
deep end... after a few goes at it [on-site defects inspections], he got head around things you know... got used to the way things were done.

Alan suggested that when George assumed Colin’s role, the process of defecting the building was well under way and that information management and sharing practices had already been established. It also suggested that George needed to complete a few inspection sessions before he was able to gain enough experience in order for him to adjust the way he managed and shared information during the defects inspection process.

When Lisa was asked the same question in relation to George’s use of his experience to manage and share information during the defects inspection process, Lisa responded:

He’s a documentation architect... so before coming to us, his role was like... to produce... you know... the documentation [the schedules]... so I suppose he did know a bit about the building which came in handy... at times he was able to recall stuff instead of checking the schedules every now and then.

The statement provided by Lisa above suggested that, due to fact that George was involved in the documentation of the building, he had already possessed some experience and knowledge with respect to its specifications and contents. This, in turn, assisted him in the management and sharing of information during the defects inspection process as he was, at times, able to recall specific detail on items he had documented earlier on during the specifications stage.

Through the researcher’s observations and examination of the interview data, it is suggested that George’s use of his experience played a factor in the management and sharing of information during the defects inspection process. Using his experience, George was able to: (a) make the necessary judgements in relation to defective items whilst on-site (b) alter the way he managed and shared information to meet the demands of the other stakeholders and environment in which he operated and (c) reduce the amount of time spent recording defects on-site.
7.7 Alan’s Stories:

The following section will explore Alan’s use of his experience to manage and share information during the defects inspection process through a series of exemplar stories.

7.7.1 Story 1 – ‘Roles and Responsibilities’

It was during the course of the first observation session when the researcher witnessed Alan’s use of experience in the management and sharing of information. Before crossing the road, and heading onto the construction site, Alan quickly briefed the other stakeholders (Colin, Lisa and the Project Manager) on the status of the project and the use of safety gear whilst on-site. He then proceeded to explain that, in his experience, for an inspection process to run smoothly, everyone needed to understand each other’s the roles and responsibilities and the process by which things needed to be completed. Alan then went on to explain that his role as the senior coordinator was to oversee the inspection process whereas Lisa’s role was to document the process and to facilitate the rectification works. However, it wasn’t until the researcher spoke to the Project Manager and architects to which their roles in the defects inspection process were made clear. The Project Manager’s role was to act on behalf of the client by relaying any necessary changes back and forth, whereas the architects were hired as independent consultants and act as a quality assurance measure within the defects inspection stage.

7.7.2 Story 2 – ‘Managing on the Phone’

It was during the third inspection session that the researcher began to notice Alan making use of his mobile phone on-site to manage and share information. The session revolved around Alan, in conjunction with Colin and Lisa, inspecting the flooring on Level 3. During this session, the researcher observed Colin and Lisa predominately making use of explicit forms of documentation (defect inspection lists, schedules, personal notebooks and drawings) to manage and share information, whereas, this was not the case with Alan. Whist the other stakeholders were recording the uneven finish on the skirting boards in the open area spaces, Alan produced his mobile phone and took a picture. After arriving back into the
office, the researcher questioned Alan as to why he took photos of the defects as opposed to recording it in a similar manner as the others did. To this he responded; ‘in my experience, it’s a lot easier if you have a picture to show the tradie [sic] what’s wrong rather than giving them a list of items describing what needs to be done’.

7.7.3 Story 3 – ‘Cutting Down the Defects’

During the seventh observation session the researcher observed Alan making use of his experience to manage and share information once more. The session revolved around Alan, in conjunction with Lisa and Colin, inspecting the classroom spaces on Level 6. After the completing the inspections of the items previously identified on the defects inspection list, the attention then turned towards the identification of new ones. As this was happening, Lisa pointed out some scuffmarks on the desks which needed to be cleaned. Alan then came over for a closer inspection and said:

*There is no need to note that one down because the tradies need to come back and install the power and data umbilical cords (see Figure 7-1). They’ll need to stand on the desks and just make them dirty again. We’ll wait till that’s installed*. Alan then continued and added, *more than likely the cleaners will pick that up when they do the final clean, I wouldn’t worry about it*.

After hearing Alan’s explanation, Lisa did not record the scuffmark as an additional defect, but instead moved onto another section of the room.
Figure 7-1: The umbilical cords used to distribute power and data from the ceiling space

7.8 Alan’s Interview Responses:

The following section explores Alan’s use of his experience in order to manage and share information. The analysis is a direct result of both the on-site informal interviews and the formal follow-up interviews conducted with Alan and the other stakeholders at the conclusion of the defects inspection process.

For the duration of the case study, it was observed that Alan was a confident and competent individual who possessed much experience in conducting defects inspections. Through his experience, Alan was able to negotiate the complex nature of the building and successfully guide the defects inspection team to the handover stage of the construction process. His experience also allowed him to reduce both the amount of time and effort taken to manage and share information through the allocation of the roles and responsibilities and the use of information management tools (in particular his mobile phone). In order to substantiate these observations, subsequent follow-up interviews were conducted with Alan. In response to a question posed in relation to the amount of experience Alan possessed within the defects inspection process, he responded:

*I have actually defected, including this building, 240,000 square metres of office space. So that’s… what it is… I told my girlfriend the other day is about 60,000 acres of office space right? So in terms of experience during the defects inspection process, I’m one of the best people to speak to.*
Alan’s statement reinforced the observations made by the researcher. It suggests that Alan was both experienced and confident in his ability to conduct and manage the defects inspection process. In order to further explore the use of his experience, Alan was asked how the use of his experience supported him in the sharing and management of information, in particular with respect to the defects inspection process. To this he responded:

*Look I think it’s got to do with... when I first came to this job... usually you go and work on a job you just... you know when you are going to finish because of the experiences you have had on others that were similar... with this job, we were kind of learning as we went along... I found it really useful to bring aspects of what I had learnt from other projects to this one... you know, like making sure everyone knew the roles and responsibilities of others... that way you knew who managed what information and where you could get it from.*

Alan continued, commenting on the benefit for experience:

*You know, if you want to be the top of the tree you need... in essence you need to know how to do most things... including managing the information... and the only way of getting there in our industry is through experience.*

Alan suggested that his experience played a significant role in the way he managed and shared information. The first of the two responses indicated that Alan was able to reflect upon his previous experience in the management and sharing of information on other projects in order to assist him with this particular case study. In his response, Alan provided one such example whereby he made sure that each stakeholder involved in the defects inspection process understood each other’s roles and responsibilities. In doing so, Alan believed that this assisted with information management and sharing procedures. They were able to identify both who was managing which piece of information, and where to source it (if needed). The second of the two responses provided by Alan identified information management as being one of the many skills required by an individual in order to progress to a management level. It also suggests that the skills necessary for progression are developed through the experiences gained by working within the industry.
Chapter Seven: The Use of Experience in the Management and Sharing of Information within the Defects Inspection Process

During the defects inspection process, Alan was often observed making use of his mobile phone as an information management tool in order to assist him with the management and sharing of information. In order to see if there was a relationship between his experience and its use, Alan was asked to reflect upon the two. To this he responded:

Yeah in my experience, the mobile phone comes in handy you know. I spend all day on-site and it makes it really hard for me to carry around stuff. The phone sits in my pocket and I can use its inbuilt functions to record and send out stuff when needed.

The statement provided by Alan above reinforced the observations made earlier by the researcher. It suggested that Alan found it difficult to carry around different forms of artefacts to support him in the management and sharing of information whilst on-site. He therefore made use of his experience by adapting his information management and sharing practices to meet the needs of the environment. Instead of carrying around bulky artefacts such as notebooks, the defects inspection lists and schedules, Alan simply made use of his mobile phone as an information management tool that assisted him with the management and sharing of information whilst on-site.

In order to verify the data that was being provided by Alan and that the on-site observation sessions were accurate, the outcomes of the analysis were also cross-referenced against data collected from the architects. When Colin was questioned in relation to Alan’s use of his experience to manage and share information during the defects inspection process, he responded:

He [Alan] is a very experienced guy, and good at what he does... his experience definitely helped him in managing the information... when you think about it, we found over 15,000 defects on this project... and if it wasn’t managed properly, we would be in a heap of trouble.

The researcher then asked Colin to provide a specific example of Alan making use of his experience to manage and share information. To this he responded:
Early on in the piece he [Alan] made sure that everyone knew what each other’s roles and responsibilities were... It made it that much easier to work out who was managing what you know. I suppose that was something he learnt from one of his previous projects.

Colin’s statements reinforced both Alan’s comments and the observations made by the researcher. The first of the two statements alluded to the fact that Colin perceived Alan as being a very competent individual who made use of his experience to assist him in the management of the 15,000 defects identified throughout the defects inspection process. The second of the two statements suggested that Alan was able to make use of the experience he had gained from completing previous projects to assist both himself and the defect inspection team in the management and sharing of information within this particular case study.

When George was asked the same question in relation to Alan’s use of his experience to manage and share information during the defects inspection process, George responded:

His experience definitely helped us... we were able to cut down on the defects that needed to be recorded… he taught me not to record things that needed to be cleaned knowing that additional work needed to be completed around it.

The statement provided above by George suggested that through the application of his experience, Alan was able to reduce the amount of defects recorded during the on-site inspections. The statement also indicated that Alan made use of his experience to share specific information relating to the defects inspection process amongst the other stakeholders involved.

Through the researcher’s observations and examination of the interview data, it is suggested that Alan’s use of his experience played an important factor in the management and sharing of information during the defects inspection process. By making use of it, Alan was able to: (a) implement an upfront strategy whereby stakeholders were able to understand each other’s role and responsibilities (b) make adjustments in the way he managed and shared information according to the
environment in which he operated within and (c) reduce the amount of time spent recording defects on-site.

7.9 Lisa’s Stories:

The following section will explore Lisa’s use of her experience to manage and share information during the defects inspection process through a series of exemplar stories.

7.9.1 Story 1 – ‘Forget the Tablet!’

It was during the fifth inspection session that the researcher first witnessed Lisa’s use of her experience to manage and share information during the defects inspection process. The session revolved around both Builders A and B in conjunction with Colin defecting the office spaces on Level 6. During the previous sessions, Lisa was observed making use of the tablet to record and update defective items, however on this occasion, it was not present. Instead Lisa made use of a notebook and pen to record defect information. When the researcher asked her where the tablet was, she responded by saying ‘it just got too hard using it... it was taking too long to enter and update stuff so that’s why I have switched to the notebook’. So for the remainder of the defects inspection process, Lisa was observed recording newly identified defective items, or items that needed to be further addressed within her notebook and the tablet left behind in her desk.

7.9.2 Story 2 – ‘Change of Roles’

It was at the end of the twenty-third inspection session (the first in which the defects inspection team had separated into two groups) where the researcher observed Lisa making use of her experience to manage and share information once more. Upon returning to the office, Alan and Lisa sat down for a debriefing session. During this session they went through the newly identified defects and any major concerns that had found along the way. At the completion of the briefing, Alan then proceeded to log onto the IDMS where he began entering in the data he had just collated from conducting the inspections. After a few attempts at trying to enter in multiple items and the system returning with error messages, Alan turned around and asked Lisa for some assistance. Lisa then had a quick read of the error message and responded:
‘oh I have seen this message before, you simply highlight the following fields and click save’. Lisa then spent the next hour or so providing Alan with support on how to make effective use the IDMS based on her experiences in managing and sharing information with the system.

7.10 Lisa’s Interview Responses:

The following section explores Lisa’s use of her experience in order to manage and share information. The analysis is a direct result of both the on-site informal interviews and the formal follow-up interviews conducted with Lisa and the other stakeholders at the conclusion of the defects inspection process.

As the defects inspection process progressed, the researcher observed Lisa making additional use of the experience she had gathered as a direct result of conducting the defects inspection process with the other stakeholders. With this experience, came an additional sense of confidence where she was able to lead an inspection session and recognise the differences between what contributed a defect and what did not. The use of her experience also allowed her to create a personalised system to record defects on-site as the use of the prescribed information management tool (the tablet) was deemed to be inefficient and time-consuming. In order to substantiate these observations, subsequent follow-up interviews were conducted with Lisa. In response to a question posed in relation to the amount of experience Lisa possessed within the defects inspection process, she responded:

*Picking out defects can be a very subjective thing... I mean, there are standards and all, and these standards have to be met... but sometimes it really comes down to the individual and their experience to make that call... Being a graduate, this was all new to me... this was the first defects inspections I was involved with... so you could say I didn’t have much experience... but after completing this one, I’m sure I could do another on my own.*

The statement provided by Lisa suggests that even though there are standards in place to support the stakeholders in the decision making process, the process itself, could be quite subjective. She then continued and suggested that the judgement of
what constituted a defective item sometimes came down to the person conducting the defect and the experience they possessed. The statement also indicated that she was new to the defects inspection process and therefore possessed a limited amount of experience in this area. However, as she progressively completed the inspections, she was able to gain experience from different sources such as the questioning and observation of the other stakeholders and the use of the defect inspection software (the IDMS). It also reinforces the observations made by the researcher whereby the experience she had gained from being involved with the defects inspection process provided her with a sense of confidence. This, in turn, assisted her in leading inspection sessions and being able to make judgements on items that were deemed defective.

In order to further explore Lisa’s use of her experience to assist her with the defects inspection process, Lisa was asked to comment upon her use of experience and the ways in which she managed and shared information. To this she responded:

*The more experience I had gained the quicker I could do things. Take for example the tablet... after using it a few times I realised that it was too slow, so I switched recording the defects in my notebook and manually entering them into the IDMS when I got back to the office.*

Following her response above, Lisa continued on and described how the use of her experience was also able to assist her with the use of the IDMS application by stating:

*In the beginning, I would send out individual lists to the people who needed them, but after a while I realised I could set up email lists within the IDMS where I was able to quickly send out the lists to the people who needed them with a click of a button... and after a while, you kind of know how the application works [the IDMS], you know the short cuts kind of like cut and paste in Word... towards the end I found myself showing Alan how to do things!*

The statements provided above by Lisa indicated that the experience she had gained from completing the inspection sessions assisted her with the management and sharing of information. The first of the three statements suggested that her
experience allowed her to adapt the way in which she recorded and managed defects whilst on-site. Through its application, Lisa was able to speed up the defects inspection process by not utilising the prescribed tablet, but instead, devised a system in which the physical printouts of the defects inspection lists and her notebook was adopted. The second and third statements provided by Lisa related to how she made use of her experience with the IDMS in order to manage and share information. With its continued use, Lisa was able to identify short-cuts in the system which allowed her to speed up the process and ultimately share this information with the other stakeholders involved.

In order to verify the data that was being provided by Lisa and that the on-site observation sessions were accurate, the outcomes of the analysis were also cross-referenced against data collected from the architects and Alan. When Alan was questioned in relation to Lisa’s use of her experience to manage and share information during the defects inspection process, he responded:

*This was quite a complex project... there were many things that we hadn’t seen before... we were constantly learning along the way... although she [Lisa] is only a junior coordinator, her experience with managing the information whilst on-site and the on IDMS was invaluable... I must admit there were times where I had to come to her for help!... By halfway through the process, she [Lisa] had gotten to the stage where we [the builders] were confident enough to let her run the inspection sessions on her own... she knew what had to be done and how the processes needed to be handled.*

Alan suggested then that through her active involvement within the inspection sessions, Lisa was able to gain valuable experience which, in turn, assisted her in the management and sharing of information. The first of the two statements indicated that in the short amount of time in which Lisa had been working with the defects inspection team, she was able to obtain a level of information management and sharing experience that proved to be invaluable to both the inspection process and the rest of the defects inspection team. Her experience allowed her to adapt and utilise different defect recording methods whilst on-site in order to speed up the process (see Section 7.9.1) as well as supporting and sharing her experiences in
using the IDMS with Alan (see Section 7.9.2). The second of the two statements reinforces the comments made by Lisa and the observations made by the researcher. It suggested that through the continued management and sharing of information within the defects inspection process, Lisa was able to gain enough experience and confidence in order to take charge of the process on her own.

When Colin was asked the same question in relation to Lisa’s use of her experience to manage and share information during the defects inspection process, Colin responded by stating:

    I can remember when I first started working with her [Lisa], she was new at this... and you could tell... everything was done by the book [procedures as outlined by the builders]... but after a few sessions, you could start to see her doing things her way...

Colin provided an example of this by stating:

    Without the tablet things happened quicker... we didn’t have to wait for her [Lisa] to enter the defects into the IDMS... she just jotted it down [into her notebook] and we moved on. I suppose she realised that using the tablet just took too long and adjusted accordingly.

Colin reinforced both the comments made by Lisa and the observations made by the researcher. They suggested that during the initial stages of the defects inspection process, Lisa managed and shared information according to the set procedures as outlined by the construction company. However, as the sessions progressed, Lisa began to utilise the experience she had gained by making adjustments to the way she managed and shared information. According to Colin, Lisa’s experience allowed her to reduce the amount of time spent on-site recording and updating the IDMS via the tablet. This was achieved by Lisa implementing a personalised information management system which involved the use of a notebook whilst on-site and then manually entering the information into the IDMS upon her return to the office.
In addition to the statements provided by Colin and Alan, George was also asked to comment on Lisa’s use of her experience to manage and share information. To this he responded:

Lisa and I were in the same boat, we didn’t have as much experience as the others [referring to the other members in the defects inspection team]. But from what I can recall, she managed the information really well... you couldn’t really tell that this was her first one.

George was then able to provide an example:

When we did the inspection sessions together she [Lisa] was able to teach me a few things she had learnt while doing the inspections with the others [Alan and Colin]. For example, not recording every single item that needs cleaning because they will get another once over before the room is complete.

George then provided a slightly different perspective to that of Colin and Alan. This could be attributed to the fact that George became involved with the defects inspection process at a later stage (see Chapter 3.4.1.2) and therefore was not present when Lisa started out. The first of the two statements suggested that although George acknowledged that both he and Lisa were not as experienced as the other stakeholders involved, he could not tell that this was her first time dealing with the management of project-related information within the defects inspection process. The second of the two statements suggested that Lisa was able to make use of the experience she had gained as a result of conducting the defects inspection sessions with the other more experienced stakeholders. Having this experience allowed her to subsequently share information (including her tacit knowledge mention in Chapter 5) with others which could ultimately save time on a construction project which involved stringent time constraints.

Through the researcher’s observations and examination of the interview data, it is suggested that Lisa’s use of her experience assisted her in the management and sharing of information during the defects inspection process. By making use of it, Lisa was able to: (a) make adjustments in the way she managed and shared information according to the environment in which she operated within (b) make judgement calls on what constituted a defect (c) reduce the amount of time spent...
recording defects both on-site and through the IDMS (d) transfer her experience to the other stakeholders by offering information in relation to conducting the defects inspection process and (e) lead a defects inspection session.

7.11 Summary:

The findings presented in this chapter show that the use of a stakeholder’s experience played a vital role in the way information was managed and shared within the defects inspection process. They suggest that although there were differing levels of experience amongst the stakeholders, there were many similarities in the way they made use of it (see Table 7.1). Upon closer examination of the researcher’s observations and follow-up interviews, the findings revealed that through the use of their experience, stakeholders were able to alter the way they managed information according to the information management tools available to them and the environment in which they operated (see Sections 7.3.1, 7.4, 7.5.1, 7.6, 7.7.2, 7.8, 7.9.1 and 7.10).

Through the on-site observations and the re-telling of the specific examples (see Sections 7.3.1, 7.3.2, 7.3.3, 7.7.1, 7.7.2, and 7.7.3), the researcher was able to observe the more experienced stakeholders (Colin and Allan) displaying many and if not all of the characteristics of experience-guided working as outlined by the work of Carus et al. (1992). The examples suggested that both Colin and Allan were able to: perceive through several senses and make use of not exactly defined information, work with a distributed attention span, display no separation between planning and execution, and allow for time-critical development of strategies even under unpredictable and chaotic situations.

Similar to the study conducted by Josephson and Hammarlund (1999), stakeholders who possessed lesser amounts of experience (George and Lisa) in construction were able to identify greater amounts of items in which they deemed to be defective. However, these items were not always recorded as being defective as experienced stakeholders (Colin and Alan) were able to make use of their experience, domain-specific knowledge and judgement to perceive these items as being acceptable and within normal range (see Chapter 5.3.2 and Section 7.3.2).
In relation to the studies conducted by Odeh and Battaineh (2002), Assaf and Al-Hejji (2006) and Sambasivan and Soon (2007), the findings also suggest that through the use of their experience, stakeholders were able to reduce the amount of delays caused by a variety of factors. These included: (a) the use of a notebook instead of the tablet to store and record project-related information, (b) the identification of items that could either be rectified at a later stage or should not be recorded as a defect, (c) disputes over items that were deemed to be defective with the contractors (tradespeople), (d) an ad-hoc approach to recoding newly identified defects and (e) a limited understanding of the roles and responsibilities of each stakeholder.

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<thead>
<tr>
<th>Stakeholder</th>
<th>Management of information</th>
<th>Sharing of information</th>
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<tbody>
<tr>
<td>Colin</td>
<td>Colin made use of his experience in a variety of ways to manage information during the defects inspection process. These included: developing a system whereby defects were checked off and recorded in a logical manner (see Section 7.3.1), the identification of items that should be recorded as a bulk defect (see Section 7.4) and making decisions that ultimately result in less items being recorded and identified as being defective (see Section 7.4).</td>
<td>The researcher’s observations and follow-up interviews suggest that Colin made use of his experience to share project-related information in order to justify why certain items should or should not be recorded as being defective. It also assisted him resolving any conflicts with the builders that may have arisen as a result of conducting the on-site inspections (see Section 7.3.2, 7.3.3 and 7.4).</td>
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<tr>
<td>Stakeholder</td>
<td>Management of information</td>
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<td>George</td>
<td>Similar to that of Colin, George made use of his experience to devise a logical system in which the newer defective items could be identified whilst conducting the on-site inspections (see Section 7.5.1). It also assisted him in altering the way he managed information to meet the demands of the other stakeholders and the environment in which he operated (see Section 7.6).</td>
<td>George was able to make use of his experience and knowledge in documenting the building in order to assist him and the other stakeholders during the on-site inspection sessions. Having this experience allowed him to share specific project-related information instantaneously rather than having to spend time referring back to explicit forms of documentation such as the drawings or schedules (see Section 7.6).</td>
</tr>
<tr>
<td>Alan</td>
<td>Alan made use of his experience to alter the way in which he managed his information whilst conducting the on-site inspection sessions with the team. Instead of carrying around explicit forms of documentation such as the defect inspection lists and schedules, Alan made use of his mobile phone as his preferred method of managing the information (see Sections 7.7.2 and 7.8). His experience also assisted him with making decision which would result in less items being identified and recorded as being defective (see Sections 7.7.3 and 7.8).</td>
<td>Alan understood the importance of information sharing throughout the defects inspection process and therefore made sure everyone understood the roles and responsibilities of the other stakeholders involved in the defects inspection process. Lisa was also observed making use of his experience to share information with the other stakeholders on what constituted a defect and what did not (see Sections 7.7.1, 7.7.2 and 7.8).</td>
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Chapter Seven: The Use of Experience in the Management and Sharing of Information within the Defects Inspection Process

<table>
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<tr>
<th>Stakeholder</th>
<th>Management of information</th>
<th>Sharing of information</th>
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</thead>
<tbody>
<tr>
<td>Lisa</td>
<td>Similar to that of Alan, Lisa was able to make use of her experience to alter the way in which she managed the information whilst conducting the on-site inspections. Her experience also assisted her with the management of information on the IDMS (see Sections 7.9.1 and 7.10).</td>
<td>Lisa’s primary role during the defects inspection process was to make sure that all information relating to the defects was managed and shared amongst the parties involved. As she gained experience, Lisa was able to transfer her experience to the other stakeholders by offering them information in relation to both conducting the defect inspections and the use of the IDMS (see Sections 7.9.2 and 7.10).</td>
</tr>
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</table>

Table 7-1: A summary of how each stakeholder made use of their experience to manage and share information

This chapter explored the stakeholders’ use of experience to manage and share information during the defects inspection process. The findings from this chapter drew upon data that was collected from a variety of sources such as on-site observation sessions and interviews. The next chapter will present and discuss the use of the stakeholders’ personalised information management practices as opposed to the enterprise information management practices adopted by their organisations.
8 The Use of Personal Information Management Versus Enterprise Information Management

8.1 Introduction

This chapter will present the research findings in relation to the stakeholder’s use of their Personal Information Management (PIM) practices as opposed to that of the Enterprise Information Management (EIM) practices adopted by their organisations. The analysis was conducted at another level, allowing the researcher to delve deeper into the information management practices within the building case study. Findings from this chapter drew upon data that was collected from a variety of sources such as on-site observation sessions, document collection and interviews (see Chapter 3.5).

8.2 Personal Information Management and Enterprise Information Management

The phrase ‘Personal Information Management’ (PIM) was first coined in the 1980s when there was much excitement over the potential of the personal computers to enhance our ability to process and manage information (Lansdale 1988; Barreau 1995 and Teevan et al. 2006). Currently, there are numerous definitions associated with the term ‘Personal Information Management’. However in the context of this study, Barreau’s definition can be seen as the most appropriate as it deals with Personal Information Management in a work-related context. Barreau (1995, p. 327) defines Personal Information Management as:

An information management system developed by or created for individual or personal use in a work environment. It includes a person’s methods and rules for acquiring the information which becomes part of the system, the mechanisms for organising and storing information, the rules and procedures for maintaining the system, the mechanisms for retrieval, and the procedures for producing the various outputs required.
In contrast, Enterprise Information Management (EIM) practices, which can also be referred to as corporate or collaborative information management, deal with how an organisation manages its information (Gartz 2004). It can be seen as a formal process which is often rigid and structured in nature. Used correctly, it is able to facilitate consistency and ease for the acquisition, storage, searching and retrieval of organisational data. It is generally bound by organisational policy and, in many instances is also required to conform to any legal frameworks in which it may sit. (Jackson 1986; Horton 1992 and Gartz 2004).

8.3 Enterprise Information Management Practices

Through the use of an information audit, the following section will outline the enterprise information management practices adopted by the builders and architects during the defects inspection process by mapping out their respective organisational approach.

8.3.1 The Architect’s Enterprise Information Management Practices

Besides conforming to the builder’s enterprise information management practices, Colin and George were also bound by their own organisation’s enterprise information management practices. It was observed that these practices were somewhat similar to that of the builders, however there were some differences in the way information was recorded, coded and stored. Figure 8-1 below illustrates the builder’s enterprise information management approach during the defects inspection process.
The architect’s enterprise information management approach begins with the architects conducting the defects inspections [A] with the builders and project manager. During the inspections the architects would create their own defects inspection list [D] using their specifically designed template (see Figure 8-3). This, along with any photographs [E] and notes [F] that contained project-related information is then taken back to the office, where it is scanned and uploaded onto the architect’s server [H]. The sever was also a location in which emails [G], updated drawings [B] and schedules [C] were stored and were able to be retrieved as needed. Physical copies of the documentation (drawings, schedules, defect inspection lists) were stored in the architect’s office [I] either on their desks or in the cardboard boxes and filing cabinets situated underneath them (see Figure 8-2).
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Upon completion of the project, the architects would engage in the services of a third party to archive and store the information at an offsite location [J].

Figure 8-2: Locations in which physical copies of project-related information was stored

8.3.2 The Builder’s Enterprise Information Management Practices

During the course of the defects inspection process, there was a common agreement between the stakeholders in relation to the ‘official’ information management approach that would be enforced. As the construction project took on a design and build contract, the builders had assumed responsibility over the project and therefore their enterprise information management practices were implemented. Figure 8-3 below illustrates the builder’s enterprise information management approach during the defects inspection process.
Figure 8-3: The builder’s enterprise information management approach

The builder’s enterprise information management approach begins with conducting the defects inspections [A]. During this process, the builders would populate the defects inspection list [F] using either the tablet which had the pre-installed IDMS application or the template described in Chapter 4.2.1. Once the defects were stored inside the IDMS [B], it was the builder’s responsibility to generate and email the lists to the appropriate stakeholders. Any emails [C], photographs [D] or notes [E] that were generated by the stakeholders and contained project-related information...
was required to be uploaded onto the ACONEX system [G] for storage. As the architects were responsible for the creation and updating of the drawings [I] and schedules [J], it was their responsibility to upload the latest versions of these documents onto the ACONEX system [G].

8.3.3 Similarities and Differences between the Two Practices

As mentioned in Section 8.3.1, it was established that there were similarities and differences in the way that the architects and builders approached their Enterprise Information Management Practices. In order to further investigate the similarities and differences, both approaches were mapped side-by-side (see Figure 8-4). Items that were highlighted in green represented documents or processes that were similar in nature, whereas items highlighted in red signified the major differences. The findings indicated that although there were many similarities between the two approaches, such as making use of emails, notes, photographs and the defect inspection lists, they would ultimately differ in the way they would store, record and code their information (see Table 8.1).
Figure 8-4: The two enterprise information management approaches mapped side-by-side
## Chapter Eight: The Use of Personal Information Management Versus Enterprise Information Management

### Information Management and Sharing Practices within a Construction Project Process

<table>
<thead>
<tr>
<th>Recording of information</th>
<th>Similarities</th>
<th>Differences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information was recorded on multiple formats which included: hand written notes, photographs and email correspondence. In addition, each stakeholder was responsible for maintaining their own records which would then be uploaded to a centralised location for storage.</td>
<td>The builder’s primary approach was to make use of the tablet with the pre-installed IDMS software as the main device to record the defects. In comparison, the architects approach was to record defects by hand (on-site) and upon arriving back into the office, transfer it onto their specifically designed defects inspection template (see Figure 8-5). It was also observed that both parties were required to record additional information to assist them in carrying out their own responsibilities to the construction project. For example: the architects were required to record specific information such as measurements and materials in order to update the schedules and drawings, whereas the builders were required to note down the contractors responsible for the rectification of items.</td>
<td></td>
</tr>
</tbody>
</table>

| Coding of information | On closer inspection of the IDMS and the architect’s specifically designed defects inspection template, there were many similarities in the way defect-related information was coded. These included: the date of the inspection, the project details, the defect or item number, the room or area number, a description of the defect, the trade or contractor responsible, the status of the defect and any additional comments. | The builder relied upon the format provided by the IDMS to code the identified defects, whereas the architects made use of a specifically designed defects inspection template (see Figure 8-5). |

| Storage of information | Both organisations made use of a centralised electronic storage system whereby defect-related information was uploaded. The builders made use of the IDMS and ACONEX system whereas, by comparison, the architects stored their electronic information on their workstations before it is backed up onto their servers. Physical copies of the documentation would be temporarily stored at their offices until such time they were no longer needed. | Besides keeping electronic copies of the documentation, the architects also engaged in the services of a third party to store the physical copies of the documentation offsite, whereas the builders took an in-house electronic approach to the archival and storage of the information through the use of their ACONEX system. |

Table 8-1: The similarities and differences between the architect and builder’s enterprise information management approaches
8.4 Multiple Methods of Information Recording, Coding and Storage

The following section will examine the stakeholders’ Personal Information Management practices in relation to their information recording, coding and storage preferences as opposed to that of the enterprise procedures. It was observed that, although all the stakeholders involved in the defects inspection process of this complex construction project were working towards the same goal, these methods varied significantly amongst the builders and architects. In addition to the differences exhibited by the two professions, it was also noted that there were differences amongst those who worked in the same role for the same organisation.

8.4.1 Colin’s Methods

As described in Chapter 3.4.1.1, Colin is a very experienced ‘site-architect’ with more than thirty years of experience within the construction industry. During this time, he has worked for various architectural practices where he has adopted various methods to record, code and store information. The following section will explore Colin’s methods in recording, coding and storing of information. The analysis is a direct result of the on-site informal interviews and observation sessions in conjunction with the formal follow-up interviews conducted with Colin.

8.4.1.1 Colin’s method of recording information

During the defects inspection process, it was observed that Colin would record information gathered via various means. Whilst on-site, and during the weekly design meetings, Colin would hand record all his notes in either his notebook (which he referred to as his booklet) or on the printed versions of the drawings. Upon arriving back at his office, Colin would then collate his field notes and create his own list for personal reference. Information would also be recorded via email conversations that transpired amongst him and the other stakeholders involved.

8.4.1.2 Colin’s method of coding information

Upon further examination of Colin’s information recording methods, and in particular the usage of his notebook, the researcher noted that Colin implemented a ‘traffic-light’ colour-coding system. Items that were urgent and required immediate
attention would be recorded in red, whilst on-going issues that required further clarification would be written in black and then highlighted in yellow. Finally, any items that had already been resolved or rectified would be written in black highlighted in green. With reference to the mark-up of the drawings, Colin made use a yellow highlighter to highlight the area in question and then proceed to add his own comments beside it.

8.4.1.3 Colin’s method in the storage of information

It was observed that during the defects inspection process, Colin made use of multiple formats and locations to store project-related information. Whilst conducting the on-site inspections, it was noted that Colin made use of his notebook as a filing system. Copies of the drawings and occasionally the physical copies of the defects inspection list provided by Lisa would be neatly folded and stored between the pages of notes he had recorded during that session. As mentioned in Section 8.4.1.1, upon returning to his office, Colin would collate his field notes and create a list for personal reference. This list was then stored in a folder on his workstation for quick reference. Apart from creating his personalised lists, Colin would also scan copies of his field-notes, annotated lists and drawings and upload them onto ACONEX. This was seen as an important process as the uploading of all project-related information to ACONEX was enforced by the builders and was seen as a mandatory requirement for the management of information during the construction process. By doing so, it provided the parties involved in the construction of the building an information management tool which they could use to protect themselves from any liabilities. It was seen as a central location in order to store, track, retrieve and share information. In terms of emails, Colin would store all project-related correspondence in a folder labelled with the building’s name. This folder then would then be automatically archived by ACONEX for storage.

8.4.1.4 Colin’s follow-up interview responses

In order to substantiate the researcher’s observations in relation to Colin’s methods by which he stored, coded and recorded information, follow-up interviews were conducted. When questioned in relation to the methods he used to record information whilst conducting the on-site defects inspections, he responded:
Yeah. Look, I’ve used different methods ... before I came to this office, I used a Dictaphone to do my defects inspections. So I’d actually take the Dictaphone and just walk around with that and record it and then give that to the secretary back in the office who actually typed that up. I think we do have a couple here in the office, but no-one seems to have bothered.

He then continued on and elaborated on the methods he specifically made use of during this project by stating:

I actually had a booklet [which was his notebook] and I just actually wrote down my defects list... I wrote down all the items and came back to the office and actually typed up my own list for personal reference... Sometimes it was easier just to scribble notes onto the drawings.

The statements provided above by Colin suggest that he had previously made use of other methods and procedures to record information during the defects inspection process. However, due to the organisational culture of his current architectural practice, Colin modified the way in which he recorded the information. The statements also reinforced the researcher’s on-site observations in which Colin made use of his notebook and the drawings to record information and, upon returning back to the office, typed it up for his own personal reference.

When questioned in relation to the process in which he used to organise (code) his information during the defects inspection process, Colin responded:

Over the years I have adopted what I like to call the “traffic-light system” it gives me a quick overview of what has already been done and what needs chasing up on...What I usually do with the drawings is highlight a section and add comments beside it.

The responses provided above by Colin reinforced the researcher’s on-site observations. They suggest that Colin had developed personalised systems in which he would organise (code) the data that was being created by the defects inspection process. It also indicated that different coding systems were used for different forms of explicit documentation. For example: when using his notebook, the ‘traffic-light
system’ was adopted whereas when he made use of the drawings he simply highlighted the section in question and added his own annotations.

In order to further explore Colin’s Personal Information Management practices, Colin was questioned in terms of the methods he used to store project-related information. To this he responded:

*Most of the time, the information regarding the defects would be stored in my booklet [notebook]. It’s where I record the defects… I also found it handy to keep the drawings folded in there as well… It keeps everything in one place… neat you know. So when I get back to the office and type it up I don’t have to search through a million things…*

With regards to storing project-related information in an electronic format, Colin responded by stating:

*Yeah, it’s also stored on my computer. I like to type it up just in-case I lose my notebook… I’ve done that before. Once the information is on my computer, we are then expected to upload our stuff onto ACONEX so that all the information was stored in one place… the system also had copies of my emails.*

The statements provided above by Colin reinforced the observations made by the researcher. It suggested that during the defects inspection process Colin employed multiple methods and formats to store project-related information. Whilst on-site Colin made use of a personalised system in which he relied upon his notebook as the primary source to store and record information. Whereas upon his return to the office, information collected would then be transferred and stored onto his workstation for personal reference. In addition to the storage of information for personal reference, Colin was also required to conform to the enterprise information management practices in which all project-related information was uploaded to ACONEX (see Section 8.4.1.3).

Throughout the defects inspection process, it was observed that Colin adopted a combination of personal and enterprise information management practices. In order to substantiate these observations, Colin was questioned in relation to the enterprise
information practices involved in the defecting of the building. To this he responded:

We actually have a system in our office that we [the architects] use on other jobs to record defects. It's a standard Excel sort of thing, a defects template you know. We just list the location of the defect and add a comment.

The statement provided above by Colin suggests that the architectural practice that designed the project had an existing in-house enterprise information management procedure in place to deal with the defects inspection process. He describes the system as being a simple Excel template in which the location and a comment relating to the defect is recorded (see Figure 8-5). However, it was also noted that during this particular construction project, this system was not adopted. When questioned in relation to why this was the case, Colin responded, ‘Lisa recorded all the defects in her system [the IDMS and ACONEX] and emailed it to us... there was no need to create our own... we could just use theirs’.

Colin then continued and commented on his own personal preferences, stating: ‘I mean we [the Architects] have certain guidelines in the office of how you should approach things and do things, I have tried to use them in the past but ultimately I prefer to use my own methods’.

The first of the two statements presented above suggests that Colin saw no point in duplicating information at an enterprise level, as this task was already being completed by Lisa through the use of the IDMS and ACONEX. Colin also alluded to the fact that the information that was being generated by Lisa contained greater levels of detail in comparison to that of the in-house system that was adopted by the Architects. If there was a need to make reference to any documents, a copy of the Builder’s documents could be sourced. The second of the two statements suggest that, although Colin understood the importance of a uniform enterprise approach to the management of information and tried to be compliant to the process as much as possible, he ultimately preferred to make use of his personalised information management practices.
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Figure 8-5: The architects’ template used to record defects

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Room No. / Area</th>
<th>Location in Room / Item</th>
<th>Description / Defect</th>
<th>Trade</th>
<th>Defect type</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>7.013</td>
<td>general</td>
<td>Fingerprints on downlights</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>south</td>
<td>Door doesn’t close, paint patchy</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>general</td>
<td>Stairs on ceiling</td>
<td>White paint on black soft</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>general</td>
<td>Lights not on</td>
<td>Carpet tiles stained/neon colour</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>west</td>
<td>Paint inside PHR cupboard incomplete</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>west</td>
<td>Signage incomplete</td>
<td>Shelving unit missing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>west</td>
<td>Edge to joinery top missing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>west</td>
<td>Lights not on</td>
<td>Adjust door closer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>general</td>
<td>Celing tiles stained</td>
<td>Cleaning incomplete</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>north</td>
<td>VESDA unit mounted on wall</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>west</td>
<td>Wall paint marked</td>
<td>7.101</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>north</td>
<td>Paint on glass</td>
<td>7.021</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>north</td>
<td>Paint around door lock uneven</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>south</td>
<td>Paint to window/skirt frame uneven</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>south</td>
<td>Teamboard missing</td>
<td>Door brushes carpet/ leaf is marked</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>east</td>
<td>Paint / carpet at column base uneven / missing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>east</td>
<td>Joinery edge missing at side (bottom)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>east</td>
<td>Repair bullehead</td>
<td>Clean skirting / sticky tape on facade</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. Must be done prior to Practical Completion.
2. Must be done within 15 working days from date of Issue of Certificate of Practical Completion or issue of defects list.
3. Variations to be undertaken in a timely manner.

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Huan Cong Vo-Tran
8.4.1.5 Summary of Colin’s methods

Through the researcher’s observations and examination of the interview data, it was revealed that Colin employed a combination of personal and enterprise information management practices. The findings indicated that his practices did not always comply with the enterprise information management procedures outlined by his architectural practice. Figure 8-5 attempts to demonstrate this by mapping his approach to information management as he completed the defects inspection process. Using the architect’s enterprise information management approach (Figure 8-1) as the basis, items with which he complied were represented in black. Whereas items in which he adopted a personal information management approach such as the notes [F] were highlighted in green. Items that were a part of the architect’s enterprise information management approach that was not utilised by Colin such as the completion of the architect’s defects inspection list [D] were displayed in red.

The diagram also incorporates (represented in blue) the enterprise information management requirements specified by the builders in which copies of his field notes, annotated lists and drawings were uploaded onto the ACONEX system [M]. Although the process of updating the drawings [B] and schedules [C] were a part of the architect’s enterprise information management procedure, these were not applicable to Colin as the only role he played in updating these documents was to forward copies of his annotations to those responsible.

The follow-up interviews conducted with Colin revealed additional insights into his information management practices. They revealed that he had previously made use of other methods and procedures to record, code and store information, and that these had to be modified as a result of him joining the architectural practice and being involved in this particular construction project. Colin’s responses also indicated that although he understood the importance of a uniform enterprise information management approach, he ultimately preferred to make use of his personalised systems to manage the information during the defects inspection process.
Figure 8-6: Colin’s information management approach

Colin’s Information Management Approach

Key
- Process
- Document or File
- Storage Location
- Personalised Information Management Approach Adopted
- Document or File not used by Colin
- Not part of Colin’s Role
- Storage Location enforced by the Builders
- Personalised Storage Location

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8.4.2 George’s Methods

As described in Chapter 3.4.1.2, George could be classified as a ‘documentation architect’ with more than ten years of experience within the construction industry. He has been involved with the architectural practice over the past five years and during that time has been mostly involved in the documentation of specifications for various buildings. The following section will explore George’s methods in recording, coding and storing of information within the defects inspection process. The analysis is a direct result of the on-site informal interviews and observation sessions in conjunction with the formal follow-up interviews conducted with George.

8.4.2.1 George’s Method of Recording Information

During the defects inspection process, it was observed that George made use of a combination of methods to record information. Whilst on-site, and during the weekly design meetings it was observed that, similar to that of Colin, George would record all his notes in either his notebook (see Figure 8-6 and 8-7) or the printed versions of the drawings. However, George would also bring along a camera to take photos of items of which he was unsure of or had a degree of complexity and bring them back to the office for further analysis. Upon arriving back at the office, George would then spend another 2-3 hours typing up meticulous notes, which he would email back through to the builders. These notes would also form the basis of the template that he completed for his architectural practice (see Figure 8-5). George would also make use of emails to record any conversations that transpired amongst him and the other stakeholders involved.

8.4.2.2 George’s Method of Coding Information

Upon further examination of George’s information recording methods, the researcher noted that George made use of multiple methods to code his information. Information recorded in his notebook varied from session to session, the information was either coded either under the date of inspection (see Figure 8-6), or organised under the description of the room (see Figure 8-7). It was observed that all notes would be recorded in black pen, and there was no use of any other
colours. In relation to the coding of information on the drawings, a simple arrow pointing to the defective area in conjunction with a short explanation was provided. Photos that were taken during the defect inspection sessions were uploaded to his workstation and a file naming convention was applied. The file naming convention involved the date of inspection and the room number. For example if the photo was taken on 28th March 2013 in classroom space 3.06 the file name would be: 28Mar2013_3.06.

Figure 8-7: George’s notes organised under the date of inspection
Figure 8-8: George’s notes organised under room description

8.4.2.3 George’s Method of Storing Information

During the defects inspection process the researcher observed George making use of multiple formats and locations to store project-related information. Whilst conducting the on-site inspections, it was observed that George made use of his backpack to physically store the explicit forms of documentation (see Chapter 5.2.3.1), whereas the photos were stored on the memory card of his digital camera. Upon returning to the office, George would transfer his field notes into a detailed electronic format. He would store a copy for himself on his workstation, email another to the builders (Lisa) and, as per the builder’s project requirements, upload another copy to ACONEX. As mention in Section 8.4.2.1, George would also transfer his field notes onto the architectural practice template (see Figure 8-5) and upload it onto their own servers for storage. Photographs were downloaded from the camera and stored within a folder on his workstation. With respects to emails, George would follow a similar system to that of Colin. He would store all project-
related correspondence in a folder labelled with the building’s name. This folder then would then be automatically archived by ACONEX for storage. In relation to the storage of the physical copies of the documentation i.e. drawings, schedules, and defect inspection lists, George made use of his desk and three cardboard boxes which sat under it. Once the documentation was no longer required, they would be archived and sent off site for storage.

8.4.2.4 George’s Follow-up Interview Responses

In order to substantiate the researcher’s observations in relation to George’s methods by which he stored, coded and recorded information, follow-up interviews were conducted. When questioned in relation to the methods he used to record information whilst conducting the on-site defects inspections, he responded:

*I can do it faster if I write it down at the time of walking through but it’s difficult to really separate the process into going through and then sending out the notes because when I do the final defects I write it down and that’s fast on-site but then I spend another two, three hours in the office to fill the information into an Excel sheet.*

George then continued on to describe how he made use of his camera to assist him in the recording of information, noting: ‘*The camera comes in real handy when a defect is too hard to explain... I find that having a photo makes it a lot quicker and easier... a picture tells a thousand words...’*

The first of the two statements provided above by George suggests that the environment in which he worked played a contributing factor in the way he recorded information. Whilst on-site, George found it difficult to complete the required documentation (the Architects’ template to record defects) to the level of detail required by his architectural practice due to the time constraints and the volume of defects identified. He therefore relied upon his personalised system of recording defects to complete the tasks (see Figure 8-6 and 8-7). Doing this resulted in him spending another two to three hours back at the office completing the architectural practices’ required documentation. The second of the two statements suggests that George made use of the camera as an alternative method to record
information and to provide him with support in completing the defects inspections. George saw the camera as a tool in which he could use in a variety of ways, these included: (a) speeding up the inspections as less time would be spent recording the details of a defect on-site; (b) deal with the complexity of the building as some things were too hard to explain with words alone and; (c) protect both him and the architectural practice from any liabilities as the photographs could serve as another source of evidence.

When questioned in relation to the process in which he used to organise (code) his information during the defects inspection process, George responded:

*I have adopted a really simple system... I usually record the defects in my notebook according to the date of inspection and room number. I can then fill in the rest of the details when I get back to the office.*

In terms of the methods used to code information on the drawings, George responded by stating:

*There was nothing fancy done to the drawings, I’d use my pen to draw an arrow pointing to the area where the defect was and then scribbled some of my own notes such as “double check the schedules” or “update drawings to reflect changes”.*

With regards to the coding of the photographs taken whilst on-site, George responded by stating: ‘*After arriving back at the office, the photos are then downloaded from my camera where the file names are changed according to the date they were taken and its location*’.

The first of the statements provided above by George validates the researcher’s observations in Section 8.4.2.2. They confirm George’s use of a personalised system in which defects were recorded and coded in his notebook according to the date and location of the inspection. However, what was observed by the researcher but not mentioned by George was how this system varied from session to session. There was no mention to the fact that in addition to coding the defects under the date and location of the inspections, they were also coded in relation to the room description (see Figure 8-6 and 8-7). The second of George’s statements makes
reference to the personalised system in which he utilised to mark-up (code) the drawings. They confirm the observations made by the researcher in which he made use of an arrow to indicate the area in which a defect was identified in conjunction with a short description. In relation to his use of the camera, George confirmed that the photographs were downloaded onto his workstation and the files renamed according to the date and location in which it was taken.

In order to further explore George’s personal information management practices, George was questioned in terms of the methods he used to store project-related information. To this he responded:

*I prefer going back to some documents or I had, and I’ll put it into a box, I had probably a pile of half a metre of documents, A3 documents, on my desk and over the project I collect all the sketches, all kinds of mark-ups that I’ve done and put them on my desk somewhere and I often go back and when I get asked I go back and look at the sketch, yes, this is what we’ve done and now I’ve put them all in a box, they get archived.*

When questioned specifically in relation to how the photographs were stored, George responded by stating:

*The photos were downloaded stored in a folder on my computer... it made it easier for me to access them, and as per the project requirements, they were uploaded to ACONEX... it was like the official place to store things.*

The statements provided above by George reinforced the observations made by the researcher. The first demonstrated George’s use of his desk and surrounding areas to store the explicit forms of documentation utilised throughout the defects inspection process. Documents that were actively being used took precedence and were stored on his desk and loosely organised based on its format, i.e., all the sketches in a pile whilst defect inspection lists in another. Documents that George deemed to be no longer active were stored in boxes under his desk. It is here that they would remain until the completion of the construction project. Upon completion, the architectural practice engaged the services of a third party to archive and store the documents at off-site locations. These documents could be retrieved at any given time at a small cost to the architectural firm. The second of
the three statements provided by George directly relates to the storage of the photographs taken whilst conducting the defect inspections. The statements re-enforces the researcher’s observations in which photos were downloaded and stored on George’s work computer. The informal on-site conversations revealed that this was done so that the photos could be viewed in greater detail on a larger screen and to provide him with the ability to insert them to the ‘architect’s design issues list’ (see Chapter 4.2.6). George also mentioned the use of ACONEX to store project-related information. He, like all other stakeholders involved, was required to conform to the enterprise information management practices adopted and enforced by the builders (see Section 8.4.1.3).

Throughout the defects inspection process, it was observed that, similar to that of Colin, George adopted a combination of personal and enterprise information management practices. In order to substantiate these observations, George was questioned about his personal information management practices as opposed to that of the enterprise approach. To this he responded:

> From what I could see, there were three... three approaches taken... mine, the architectural practices’ [the name of the architectural practice was used here] and the builders’... each approach was a little different... I suppose everyone had different requirements...

The statement provided above suggests that George perceived three different types of practice in the management of information during the defects inspection process. Each had their own set of requirements. It also suggests that, although a uniform enterprise information management approach was implemented and enforced by the builders, George continued to make use of his own personalised system in conjunction with that of his architectural practice. In order to further explore why this was the case, George was then asked to elaborate. To this he responded:

> ‘At the end of the day, I am employed by [name of architectural practice removed], so I need to make sure that I meet their requirements...Sure I’m doing it differently to what the builders would like it to be... but this is the system I use and it works!’
The first of the two statements provided above by George suggests that although there was an enterprise information management approach implemented and enforced by the builders, George was still required to fulfil his obligations to his employer. In doing so, George needed to make sure that he was compliant with their information management policies and procedures that had already been set in place. This included the completion of the ‘architect’s template used to record defects’ (see Figure 8-5) and the archive of documents related to the construction project. The second of the two statements suggests that, similar to that of Colin, George understood the importance of a uniform enterprise approach to the management of information and tried to be compliant with the process as much as possible, but ultimately preferred to make use of his personalised information management practices to deal with the defects inspection process.

8.4.2.5 Summary of George’s Methods

Through the researcher’s observations and examination of the interview data, it was revealed that George also employed a combination of personal and enterprise information management practices. The findings indicated that unlike Colin, George attempted to comply as much as possible with the enterprise information management procedures as outlined by his architectural practice, which included the duplication of defects inspection list information onto their own templates. Figure 8-8 will attempt to demonstrate this by mapping George’s information management approach against that of the architect’s enterprise information management approach as he completed the defects inspections process. When compared with Colin’s information management approach, several clear distinctions could be seen. The first was George’s use of the architect’s defects inspection list [D] (see Figure 8-5) and photographs [E] whereas Colin did not make use of these and relied upon the lists that Lisa created (see Section 8.4.1.4). The second distinction was that due to his role as a documentation architect (see Chapter 3.4.1.2) George was required to update the schedules [C] disseminate them to both his architectural practice and the builders via ACONEX.

The follow-up interviews conducted with George revealed additional insights into his information management practices. They revealed that George saw three main
approaches to the management of information during the defects inspection process (see Section 8.3.2.4) with each possessing their own set of requirements. The interviews also suggest that whilst completing the inspections, George understood the importance of each system and subsequently spent time maintaining all three.
Figure 8-9: George’s information management approach
8.4.3 Alan’s Methods

As outlined in Chapter 3.4.1.3, Alan describes himself as an experienced site manager with more than ten years’ experience in the construction industry. Alan specialises in the inspections and handover stages of the construction process and has personally defected over 240,000m² of office space. The following section will explore Alan’s methods in recording, coding and storing of information within the defects inspection process. The analysis is a direct result of the on-site informal interviews and observation sessions in conjunction with the formal follow-up interviews conducted with Alan.

8.4.3.1 Alan’s Method of Recording Information

During the course of the defects inspection process, the researcher observed a change in the way in which Alan recorded information. This could primarily be attributed to the change in his role (see Chapter 6.1.5). Whilst conducting the on-site inspections with the team, Alan rarely took notes or recorded any project-related information, instead he relied on Lisa to record information on his behalf. When he did take notes, it was generally through the notes section of his mobile phone. In addition to taking notes, Alan’s mobile phone was used to take photographs of items that required further clarification upon his return to the office. In relation to the inspections sessions conducted with Colin, Alan employed a combination of formats to record information. During these sessions, Alan continued to make use of his mobile phone to take photographs. However, due to the change in role and the absence of Lisa and her tablet, Alan was observed recording project-related information directly onto the printouts of the defects inspection lists. These notes would then be brought back into the office where they would be updated onto the IDMS. Emails were also used to record any conversations that transpired between him and the other stakeholders involved.

8.4.3.2 Alan’s Method of Coding Information

Similar to that of his information recording methods, the researcher observed a change in the way Alan coded information during the course of the defects inspection process. While conducting the on-site team inspections, the information
recorded on his mobile phone was automatically attributed (coded) with the date and time in which the note was taken. Upon closer inspection, the researcher noted that the information recorded on his phone was coded by the room number, followed by a hyphen and then the description written ‘text speak’. For example, if Alan was required to record a defect in relation to the missing whiteboard in room 6.03 it would be coded as follows: ‘6.03 – wboard msing’. In addition to the use of text to code information, Alan also made use of visual means. As described in Chapter 4.2.1, Alan made use of a colour-coded sticker system in which he would use colour stickers to identify the type and location of a defect. In relation to the method in which he would code information during the inspection sessions conducted with Colin, Alan was observed making use of what the researcher describes as the ‘ticks, crosses and circle’ system. The system involved Alan ticking off items on the defects inspection list that had already been rectified, crossing items which had not been rectified and circling the defects inspection number of items that he was unsure of, and required additional clarification upon his return to the office.

8.4.3.3 Alan’s Method of Storing Information

Whilst conducting the on-site inspections with the team, Alan made use of his work mobile phone as the primary device to store photographs and project related information. Upon returning back to the office, he used it as the basis to chase up any outstanding issues, whereas, when he conducted the inspections with Colin, Alan would store the annotated defects inspections lists on his desk until they were entered into the IDMS. Physical copies of these lists would then be scanned and uploaded onto the ACONEX system for storage. Once this process had been completed, the documents were then shredded and disposed of. In addition to the storage of project-related information on the IDMS, and ACONEX, Alan was also observed making use of his emails to store project-related information. This included correspondence between himself, the contractors and any other stakeholders involved in the defects inspection process.
8.4.3.4 Alan’s Follow-up Interview Responses

Follow-up interviews were conducted in order to substantiate the researcher’s observations in relation to Alan’s methods in which he stored, coded and recorded information. When questioned in relation to the methods he used to record information whilst conducting the on-site defects inspections, he responded,

*Like I said before, I’m on-site all day... it’s pretty hard to carry additional stuff around, so if I need to record anything my phone is the best bet... The best part about it was that sometimes things are just too hard to explain so having the camera function and taking a photo helps. A picture tells a thousand words!*

The statements provided by Alan above reinforce the observations made by the researcher. They suggest that due to his role as a site manager and the environment in which he operated in, Alan found it difficult to carry around any additional material to support him with the recording of information. When information was required to be recorded on-site, Alan’s work mobile phone was used. Alan saw the phone as his personal note taking device as well as a camera to record and explain complex items.

As mentioned in Section 8.4.3.1, the researcher observed a change in the way Alan recorded his information due to his change in role. In order to further explore and reinforce the observations made by the researcher, Alan was asked to reflect upon his information recording methods whilst conducting the inspections with Colin. To this he responded:

*Yeah, when Lisa was not around, I had to record the defects... it wasn’t too bad... I’d log into the IDMS print out the list and tick it off as we went along... when you get back to the office, you... you just fill out what you recorded back into the IDMS.*

When questioned specifically in relation to the use of his phone to record information, Alan responded: ‘*My phone? Yeah, that was only used to take photos. Now the notes were recorded directly onto the lists’.*
Alan’s responses above support the observations made previously by the researcher. They suggest that the change in role, led to a change in the way in which he recorded information. Although his mobile phone was still used to record the photographs, it was no longer used to take notes, instead, whilst on-site the defect inspection lists became Alan’s primary instrument for recording information.

When questioned in relation to the process he used to organise (code) his information during the defects inspection process, and in particular the system he adopted for his mobile phone and the defects inspection lists, Alan responded by stating:

> I kind of had a system going on my iPhone… it was nothing fancy… all I did was fire up the notes section and type in the room number, a dash and a brief description of the defect… With the lists… I’d place a tick next to the items that had already been fixed, a cross next to the ones that hadn’t and circle the ones I was unsure of… because sometimes an item might appear on the list and we can’t physically find it… and with the newer defects we identify along the way, they just get added to the bottom of the list.

The above response provided by Alan reinforced the observations made by the researcher. His responses indicated that there were two main coding systems he used to manage the information and that the system that was adopted was dependant on the role that he performed. Whist conducting the inspection sessions with the team, Alan adopted a simple coding system in which defects were recorded by room number and a short description (see Section 8.4.3.2), whereas when he conducted the individual inspection sessions with Colin the ‘ticks, crosses and circles’ system was applied.

In order to further explore Alan’s personal information management practices, Alan was questioned in terms of the methods he used to store project-related information. To this he responded:

> Most of the information was stored either on my phone, through emails and the systems we have in the office [IDMS and ACONEX]… I didn’t really have to store paper copies of things, and if I did, it sat on my desk.
Chapter Eight: The Use of Personal Information Management Versus Enterprise Information Management

The statement provided above by Alan reinforced the observations made by the researcher. It suggests that he made use of a combination of personal and enterprise approaches to store project-related information, and that a majority of this information manifested itself in electronic form. Alan’s response also alluded to the fact that during the defects inspection process, he did not find much need to store physical copies of project-related documentation, and when he did, they were stored within a pile upon his desk.

Throughout the defects inspection process, it was observed that, similar to that of the architects, Alan adopted a combination of personal and enterprise information management practices. In order to substantiate these observations, Alan was questioned about his personal information management practices as opposed to that of the enterprise approach. To this he responded:

_We have a few systems in place to deal with information here… the IDMS and ACONEX… ACONEX was our official system, it stored all the project information… everyone had to use it including the architects. Whereas the IDMS was a system we used to control the defects inspection process._

In relation to the use of his own personalised systems, Alan responded:

_Yeah I must admit I had my own systems going as well… but so did the architects… you know. Colin will write his list and all that sort of stuff and George will write his list. But ultimately we use our list as the main list._

The statements provided above by Alan suggest that as an experienced site manager, he understood the importance of the enterprise information management approach adopted by his organisation and, in particular, its relevance to the defects inspection process. In adopting the enterprise information management approach, it provided both himself and his organisation a system in which they could uniformly control the information that was being produced. However, that being said, Alan also acknowledged that although there was an enterprise information management approach in place, he, along with the other stakeholders (Colin and George), adopted their own personalised approaches to the management of information during the defects inspection process.
8.4.3.5 Summary of Alan’s Methods

Through the researcher’s observations and examination of the interview data, it was revealed that Alan employed a combination of personal and enterprise information management practices. They also revealed that Alan altered the way in which he managed the information according to the role in which he was assigned. Figure 8-9 demonstrates this by mapping Alan’s information management approach as he conducted the defects inspections with the team, whereas Figure 8-10 will map the changes made as a direct result of conducting the individual inspection sessions with Colin. When these two approaches were compared side-by-side, several clear distinctions could be seen. The first was the management of builder’s defects inspection list [F] and the IDMS [B]. Although these tasks were meant to be completed by both Alan and Lisa, it was observed during the inspection sessions conducted with the team, this task was left to Lisa to complete (see Section 8.4.3.1).

The second distinction was the way in which Alan recorded his notes. During the team inspections, notes [E] and photographs [D] were recorded by using his mobile phone [K] whereas, during the individual sessions conducted with Colin, Alan was observed taking a greater quantity of notes which were directly recorded onto the defect inspection lists [F].

The follow-up interviews conducted with Alan revealed additional insights into his information management practices. They revealed that Alan understood the importance of an enterprise information management approach and encouraged its use with the other stakeholders. Through its use, he believed that it allowed both himself and the organisation a uniform way to manage the information that was being produced. However, although Alan advocated the concept of enterprise information management, he did acknowledge that he, along with the other stakeholders involved in the process, did not always fully comply with it. Instead, they employed a combination of personalised information management approaches in order to make sense of and deal with the complexity of information produced during the defects inspection process.
Chapter Eight: The Use of Personal Information Management Versus Enterprise Information Management

Figure 8-10: Alan’s information management approach when conducting defect inspection sessions with the team

Builder A’s Information Management Approach
(when conducting defects inspections with the team)

* Please note, this approach assumes that all documentation is converted into an electronic format and stored either on the IDMS, ACONEX or Builder A’s mobile phone

Key
- Process
- Document or File
- Storage Location
- Personalised Storage Location
- Link Not Utilised
- Document or File not used by Builder A
- Storage Location not utilised by Builder A
- Personalised Information
- Management Approach Adopted
- Personalised Link Created

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Figure 8-11: Alan’s information management approach when conducting the individual defects inspection session with Colin

Builder A’s Information Management Approach
(when conducting defects inspections with Architect A)

Key
- Process
- Document or File
- Storage Location
- Personalised Storage Location
- Link Not Utilised
- Document or File not used by Builder A
- Storage Location not utilised by Builder A
- Personalised Information Management Approach Adopted
- Personalised Link Created

* Please note, this approach assumes that all documentation is converted into an electronic format and stored either on the IDMS, ACONEX or Builder A’s mobile phone.
8.4.4 Lisa’s Methods

As described in Chapter 3.4.1.4, Lisa describes herself as a junior coordinator who is currently being rotated through the different facets of the construction process as part of her graduate entry program. Her primary role on this project was to coordinate the defects inspection process which involved the inspection and recording of all the defects identified and forwarding these onto the contractors for rectification. The following section will explore Lisa’s methods in recording, coding and storing of information within the defects inspection process. The analysis is a direct result of the on-site informal interviews and observation sessions in conjunction with the formal follow-up interviews conducted with Lisa.

8.4.4.1 Lisa’s Method of Recording Information

During the defects inspection process, it was observed that Lisa would make use of a tablet to record the defects. The tablet contained a mobile version of IDMS application and had the ability to sync with her workstation and the IDMS server as well as take photographs. However, even though the technology was available, Lisa often opted for the use of a pen, the physical copy of the defects inspection list and a notebook to record information. It was observed that although she did carry around copies of the schedules and drawings, information was not recorded on these. For the information that she did record on the artefacts as mention previously, these were subsequently brought back to the office where she would then spend time entering the detailed notes into the IDMS.

8.4.4.2 Lisa’s Method of Coding Information

Upon closer examination of Lisa’s information recording methods, the researcher noted that two of the three main systems she used to code her information were quite similar. On occasions when she made use of the tablet to record the defects, Lisa was forced to use pre-defined codes utilised by IDMS. This included her entering the room location, the item, sub-item, orientation, position, the ‘passed’ status, comments, contractor, item status and responsible inspection company (see Figure 4-12). Similarly, when she made use of her pen and notebook, a majority of the headings were organised in the same manner except for the omission of the
‘passed’ status, contractor and responsible inspection company fields. These fields were omitted as Lisa saw them as either being redundant, repetitive or not necessary at the time of the on-site inspections. In relation to the coding of the physical defects inspection lists, Lisa made use of a system of ticks, crosses and asterisks. Any items that had been rectified received a tick beside it, whereas items that had not received a cross. Finally, items in which required further clarification had an asterisk placed beside it.

8.4.4.3 Lisa’s Method of Storing Information

Throughout the defects inspection process the researcher observed Lisa making use of multiple formats and locations to store project-related information. Whilst conducting the on-site inspections, information was stored through the use of her tablet, notebook and the physical copies of the defects inspection lists. The tablet was also used to take and store photographs of defective items identified along the way. Upon returning to the office, Lisa would either sync the tablet with her workstation which, in turn, updated and stored the information within IDMS, or directly log into the IDMS and manually transfer the notes she had taken in her notebook or the physical copies of the defects inspection lists. With respect to the photographs that were taken during the defects inspection process, they too were transferred onto her workstation and synced with the IDMS for storage. They were also backed up on the ACONEX server. Physical copies of the documentation, which included the printout of the defects inspection lists, schedules, her personal notebook and drawings were stored within a pile on her desk. It is here that they would remain until such time as they were superseded by a newer version or were deemed by Lisa as being no longer necessary. Once this decision had been made, Lisa was then observed scanning copies of these documents and uploading them onto ACONEX for storage. The physical copies were then sent to the paper shredder for disposal. In relation to the storage of emails, Lisa would follow a similar system to that of the other stakeholders involved in the defects inspection process. She would store all project-related correspondence in a folder labelled with the building’s name. This folder would then be automatically archived by ACONEX for storage.
8.4.4.4 Lisa’s Follow-up Interview Responses

Follow-up interviews were conducted in order to substantiate the researcher’s observations in relation to Lisa’s methods by which she stored, coded and recorded information. When questioned in relation to the methods she used to record information whilst conducting the on-site defects inspections, she responded:

Well as you know, the tablet was what we primarily used to record the defects whilst we [the builders] were on-site... like, it ran the IDMS program... that was the official place were all the defects were supposed to be recorded.

Lisa then continued on and elaborated on why she made use of her personalised system in favour of the enterprise approach adopted by her organisation by stating:

When you are defecting, things move quickly... you don’t have the time to fill in the all the fields... using the tablet slowed things down, and plus the IDMS is... it’s very archaic, it’s not the best program in the world... but it is something we have to use... that’s why I use my notebook, like, I can record it quicker there and fill in the rest when I get back to the office.

The statements provided above by Lisa reinforce the observations made by the researcher in Section 8.4.4.1. They suggest that whilst on-site, Lisa made use of a variety of formats and methods to record project related information. According to Lisa, the tablet was the official method used to record defects, however this device was not used on a regular basis as Lisa saw it as being archaic and time-consuming. Instead, Lisa found it easier to make use of her notebook to record the defects and transfer it directly onto the IDMS desktop interface upon arrival back into the office.

When questioned in relation to the process she used to organise (code) her information during the defects inspection process, Lisa responded:

Most of the information was already coded for me through the IDMS system so there was not really any coding to be done...like, all I really had to do was to fill in the pre-defined IDMS fields on the tablet or on my workstation.

Lisa was then asked to elaborate specifically on how she coded her information whilst making use of her personalised system, to this she responded by stating:
When I used my notebook, I tried to keep the fields as similar as possible to the fields in the IDMS, that way when I got back to the office it made it easier for me to transfer it across. As for the lists… I just ticked the ones that were complete, the ongoing ones got a cross and the ones I was unsure of got an asterisk.

The responses provided above by Lisa reinforce the observations made by the researcher in Section 8.4.4.2 in which two out of the three main information coding systems utilised by Lisa were of a similar nature. The first response suggests that when she made use of the IDMS, the codes were already pre-defined and that there was a specific way in which information could be entered into the system. As the IDMS was the official place to record and store the defects, Lisa saw it logical to set up a similar system in her notebook so that when the time came to transfer her notes into the IDMS they were already in a suitable format. In relation to the coding of the physical copies of the defects inspection lists, Lisa confirmed the observations made by the researcher in which she made use of her ‘ticks, crosses and asterisks’ system (see Section 8.4.4.1).

In order to further explore Lisa’s personal information management practices, Lisa was questioned in terms of the methods she used to store project-related information. To this she responded:

When I am on-site I use the tablet to record the information… this then gets synced with my workstation and ultimately gets stored in the IDMS. As for the paper - copies of the lists and stuff were kept on my desk till a newer version was available… um… or it was no longer needed… they would then be scanned and uploaded to ACONEX.

Lisa then continued on and elaborated as to why the documents were converted into an electronic format by stating: ‘We [the builders] work out of a small site office so space is a premium… there’s just not enough space to store all the documents so we scan them and keep them as electronic files’.

The responses provided by Lisa above reinforce the observations made by the researcher in Section 8.4.4.3. They suggest that Lisa made use of multiple locations and formats to store project-related information. Whilst on-site, Lisa perceived the
tablet as a device that was used to record defects, and that the storage of this information was actually on the IDMS. However, throughout this process, it was observed that Lisa did not realise that the use of the tablet, defects inspection lists and her notebook could all be seen as locations in which information was temporarily stored. When it came to the storage of the physical documentation, Lisa made use of her desk. Once again, this could be seen as a temporary storage location, as Lisa explains that due to the lack of space within the site office, physical copies of the documentation needed to be converted into an electronic format and stored within the ACONEX system.

Throughout the defects inspection process, it was observed that, similar to that of the other stakeholders, Lisa adopted a combination of personal and enterprise information management practices. In order to substantiate these observations, Lisa was questioned about her personal information management practices as opposed to that of the enterprise approach. To this she responded:

*Being new to this I tried to follow exactly what was required by [the name of the builders] ... this meant doing things their way. The only reason why I used the notebook and the printout of the lists [defect inspection lists] was that the tablet was too slow.*

The response provided above by Lisa suggests that, like Alan, Lisa understood the importance of an enterprise information management approach. Being new to the organisation and the defects inspection process, Lisa tried to be as compliant as possible. However, this was not always case. During the on-site inspections, Lisa quickly realised that the tool (the tablet) that was provided by her organisation in order to assist her with the process had the opposite effect. The use of the tablet often slowed her down and therefore she reverted to her own personalised information management approach making use of her notebook to record the defects.

### 8.4.4.5 Summary of Lisa’s Methods

Through the researcher’s observations and examination of the interview data, it was revealed that, similar to that of the other stakeholders, Lisa employed a combination
of personal and enterprise information management practices. It was observed that throughout the defects inspection process, Lisa understood the importance of an enterprise information management and tried to be as compliant as possible to the processes adopted by her organisation. However, due to the speed in which the inspections happened, the ‘archaic’ nature of the IDMS, and the excess time taken to record the defects on the tablet, personalised information management practices were adopted. Figure 8-11 will attempt to demonstrate the areas in which Lisa made use of her personalised information management practices against that of the builder’s enterprise information management approach.
Upon closer examination of Figure 8-12, it is suggested that Lisa complied with all the requirements of the builder’s enterprise information management approach. However, this was achieved by supplementing certain sections [C], [E] and [D] with her own personalised information management approaches (see Sections 8.4.4.1 to 8.4.4.4).
8.5 Summary

The findings from this study indicated that there was a combination of both personalised and enterprise information management processes adopted whilst the stakeholders completed the defects inspections. Although stakeholders acknowledged the formal enterprise information management practices that were in place, they would often make use of and rely upon the personalised systems that they have been accustomed to. The findings also revealed although there was an agreed enterprise information management approach adopted throughout the inspection process (see Section 8.8.2), the architects, and in particular George, spent additional time managing up to three different practices, each comprising of their own sets of requirements (see Section 8.4.2.4).

Studies conducted by Barreau (1995); Jones et al. (2002); and Gwizdka & Chignell (2007) suggest that work is highly situational, context-based and constrained. This in turn, influences the way that information is handled and managed. In the context of this study, the project and its environment (construction site) was a major factor in the way the information was managed. The short timeframe in which the stakeholders operated meant that correct enterprise information management procedures were rarely adhered to and that the stakeholders often supplemented this with their own personalised information management systems. These personalised systems provided the opportunity for stakeholders to contextualise and add value to the information that they possessed. Thus, in turn, allowing them to complete their goals.

In relation to the differences in the stakeholders’ personalised information management behaviours Gwizdka and Chignell (2007) suggest that even though stakeholders who possess similar profiles (job and demographics) can exhibit huge differences in their behaviour (management and presentation), these differences can be applied both in respect to the management of paper-based documents and electronic resources.

Through the on-site observation sessions and follow up interviews, the findings in relation to the information management practices of the stakeholders confirmed the statements made by Gwizdka and Chignell in 2007. The study’s findings indicated
that the stakeholders, in particular Colin and George, who held similar roles whilst completing the defects inspections, ultimately made use of their own, very personalised systems to code, record and store project related information (see Table 8.2), in preference to the agreed upon enterprise information management approach.
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<th>Recording of information</th>
<th>Coding of information</th>
<th>Storage of information</th>
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<td>Colin</td>
<td>Colin recoded project-related information via various means. These included: his notebook, printed versions of the drawings, personal list as a result of collating his field notes and the use of his email (see Sections 8.4.1.1 and 8.4.1.4).</td>
<td>Colin implemented several different systems to code project-related information. These included: the ‘traffic-light’ colour-coding system, the use of a highlighter to mark-up the drawings and a folder labelled with the building’s name to store project related emails (see Sections 8.4.1.2 and 8.4.1.4).</td>
<td>Colin made use of multiple formats and locations to store project-related information. These included: the use of his notebook as a filing system, his desk, the office computer to store his list for personal reference, the architect’s server, the ACONEX system and his email inbox (see Sections 8.4.1.3 and 8.4.1.4).</td>
</tr>
<tr>
<td>George</td>
<td>George also recorded project-related information via various means. These included: the use of his notebook, printed versions of the drawings, photographs taken whilst on-site, typed up lists as a result of collating his field notes, the architect’s defects inspection template and the use of his email (see Sections 8.4.2.1 and 8.4.2.4).</td>
<td>Like Colin, George also implemented several different systems to code project-related information. These included: the date and description methods used in his notebook, the arrow and explanation system used on the drawings, the file naming convention applied to the photographs and the folder labelled with the building’s name to store project related emails (see Sections 8.4.2.2 and 8.4.2.4).</td>
<td>George made use of multiple formats and locations to store project-related information. These included: his backpack to store explicit forms of documentation, the memory card on his camera, the hard drive on his office computer to store the lists created as a result of his field notes and photographs, his desk, the cardboard boxes under his desk, the ACONEX system, the architect’s server and his email inbox (see Sections 8.4.2.3 and 8.4.2.4).</td>
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Chapter Six: The use of Explicit Knowledge in the Management and Sharing of Information within the Defects Inspection Process

Information Management and Sharing Practices within a Construction Project Process

<table>
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<th>Alan</th>
<th>Recording of information</th>
<th>Coding of information</th>
<th>Storage of information</th>
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<tr>
<td>Alan</td>
<td>Alan recorded project-related information via various means. These included: the use of his mobile phone to record notes and take photos, the printout of the defects inspection lists, the IDMS and his emails (see Sections 8.4.3.1 and 8.4.3.4).</td>
<td>Alan implemented several different systems to code project-related information. These included: the ‘text speak’ system on his mobile phone, the colour-coded sticker system for identifying defect types and the ‘ticks, crosses and circle’ system used on the physical copies of the defects inspection lists (see Chapter 4.2.1 &amp; Sections 8.4.3.2, and 8.4.3.4).</td>
<td>Alan made use of multiple formats and locations to store project-related information. These included: his mobile phone to store photographs and notes, his email inbox to store project-related correspondence, the IDMS and ACONEX systems and his desk to temporarily store physical copies of the documentation (see Sections 8.4.3.3 and 8.4.3.4).</td>
</tr>
<tr>
<td>Lisa</td>
<td>Lisa also recorded project-related information via various means. These included: the tablet which contained a copy of the IDMS application, her personal notebook, copies of the defects inspection lists and directly into the IDMS interface via her computer (see Sections 8.4.4.1 and 8.4.4.4).</td>
<td>Similar to that of Alan, Lisa made use of several different systems to code project-related information. These included: the IDMS and ACONEX systems, her cut down version of the IDMS fields in her notebook and the ‘ticks, crosses and asterisks’ system (see Sections 8.4.4.2 and 8.4.4.4).</td>
<td>Lisa made use of multiple formats and locations to store project-related information. These included: the tablet, her computer workstation, the IDMS and ACONEX systems, her notebook, her desk and her email inbox (see Sections 8.4.4.3 and 8.4.4.4).</td>
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Table 8-2: A summary of the multiple methods used by stakeholders to record, code and store information
This chapter explored the stakeholder’s use of their Personal Information Management (PIM) practices as opposed to that of the Enterprise Information Management (EIM) practices adopted by their organisations. The findings from this chapter drew upon data that was collected from a variety of sources such as: on-site observations, document collection and interviews. The next and chapter will present and discuss the implications of this analysis for the management and sharing of information during the defects inspection process.
9 Discussion

9.1 Introduction

The following chapter will provide a summary of the discussions surrounding major themes related to the management and sharing of information during a complex construction project. It will discuss the implications for the construction industry, with a particular focus on the defects inspection process. A detailed table outlining the key findings mapped against the extant literature is also provided and can be found in Appendix D: Table of Key Findings.

9.2 Discussion of the Research Outcomes

9.2.1 The Iterative and Complex Nature of the Defects Inspection Process

Through conducting an information audit of the defects inspection process, it was established that the process was not as simple and linear as described by one of the central stakeholders (see Chapter 4.2.9). Instead, from an information management and sharing perspective, it could be seen as a complex process that was iterative in nature. The findings from the audit showed that in total, seven formal sub-processes were identified from which sixteen lists were generated. These sub-processes were supplemented by an additional one created specifically for this construction project and an additional eight informal lists that were created and maintained by the stakeholders.

9.2.2 The Central Role of Knowledge in the Management and Sharing of Information

Knowledge, in any form (tacit, explicit or domain-specific) was seen in the research as a vital component, which assisted in the management and sharing of information during the defects inspection process. Stakeholders who possessed more experience tended to rely more upon the use of both their tacit and domain-specific knowledge, whereas less experienced stakeholders often relied upon the explicit. From the analysis of the combined interview transcripts, a word cloud was created using NVivo (see Chapter 3.7.2.1). The results confirmed the importance of knowledge
in this part of the construction process by graphically demonstrating how “know” was the most frequently stated term. Within the context of the interviews and this study, the term “know” often related to the “knowing” of what to do, and in addition having the “knowledge” to fulfil their duties.

Figure 9-1: Word cloud map derived from the participants’ interview transcripts

This knowledge was exemplary of the forms of knowledge implicit in the extant literature. However, its use was differentiated through the roles of the stakeholders involved.

9.2.2.1 Tacit Knowledge

The use of tacit knowledge to manage and share information varied amongst the stakeholders according to their experiences, domain-specific knowledge and their reliance on explicit forms of documentation. Stakeholders who possessed greater amounts of experience and domain-specific knowledge were able to continually make use of this knowledge as a reference point as well as a conflict resolution tool while conducting the on-site inspections.

The sharing of tacit knowledge (information) was not openly distributed amongst the team. In order to explain this, a combination of Goffman’s (1959) dramaturgical
perspective and Nonaka’s (1994) SECI model was applied. Through Goffman’s (1959) perspective, the stakeholders were seen as actors in a performance (defects inspection process) with selected explicit and tacit knowledge being shared amongst the audience (defects inspection team) on the front stage and personalised (internalised) tacit knowledge stored at the back. Experienced stakeholders such as Colin and Alan tended to have a greater back-stage presence whereby they were able to control the performance through selecting what information (tacit knowledge) they would share and send forth. In determining which bits of information were shared, a “trigger event” had to be initialised (see Chapter 5.12). This enabled stakeholders to tap back into what they had previously internalised and stored as tacit knowledge in order to share it with the external environment (Nonaka 1994).

9.2.2.2 Explicit Knowledge

Similar to that of tacit knowledge, the use of explicit knowledge differed amongst the stakeholders involved in the defects inspection process. Stakeholders who possessed less experience relied more upon the use of explicit forms of documentation (explicit knowledge) to enable them to feel a sense of security, which, in turn, allowed them to resolve any issues that may have arisen during the inspections.

In addition to making use of explicit forms of documentation to resolve conflict, the stakeholder’s role during this process also had a direct influence on the way information would be managed and shared. The findings highlighted that throughout this process, there needed to be an “information manager” whose primary role was to ensure that the explicit forms of documentation were up-to-date and disseminated amongst the parties involved. When there was a “perceived” lack of an “information manager”, for example when the team was split into two, the responsibility of managing the explicit forms of documentation fell upon another stakeholder which ultimately altered the way in which they managed and shared information.

Zach (1999) suggested explicit knowledge works well in organisations that operate on routineness and patterns, but where imagination and flexibility were important,
knowledge and routinisation was deemed to be inappropriate or hindering the creativeness process. Within the context of this study, this was the case. The defects inspection process could be seen as a process whereby a great amount of flexibility in terms of judgement was required. This flexibility in judgement was demonstrated numerous times by experienced stakeholders who use their experience and tacit knowledge to reclassify items that less experienced stakeholders had previously identified as being defective (see Chapter 7.7.3).

Apart from the differences, there were also many similarities amongst the stakeholders’ use of explicit forms of documentation. Through its use, stakeholders were able to deal with the volume of information presented to them due to the complex nature of the building as well as to ensure that they were able to protect themselves from any liabilities that they may encounter as a direct result of conducting the inspection sessions.

9.2.2.3 Domain-specific Knowledge

Domain-specific knowledge was a common theme that was expressed during the exploration of the information management and sharing practices of the stakeholders during the defects inspection process. It was seen as vital to the stakeholders, as it was used in conjunction with the management and sharing of tacit knowledge and the comprehension of the explicit. Domain-specific knowledge could also be seen as being tied closely with use of experience (Glaser 1984; Alexander & Judy 1988; Carey & Spelke 1994).

The findings from this study indicated that domain-specific knowledge was one of the major contributing factors that aided in the inspections process whereby a stakeholder was able to internalise information to create new tacit knowledge (see Chapter 5.12). The possession of domain-specific knowledge also enabled stakeholders to comprehend both the complex and technical nature of documents that are often produced within the construction industry.

Through the researcher’s observations stakeholders who possess domain-specific knowledge from more than one domain can be seen as the conduits that hold multi-disciplinary teams together. They are able to take on multiple roles in order to facilitate a common dialogue between stakeholders from various domains which,
Chapter Nine: Discussion

in turn, leads to effective sharing of information with one another. Within the context of this study, Lisa was seen as the conduit as she possessed domain-specific knowledge in both architecture and construction.

9.2.3 The Role of Experience in the Management and Sharing of Information

Like knowledge, experience was seen as a vital component that assisted in the management and sharing of information during the defects inspection process. Although there were differing levels of experience amongst the stakeholders, the findings indicated that there were similarities in the way they made use of it. Through its use, stakeholders were able to reduce the amount of delays caused by a variety of factors such as resolving disputes over items that were deemed as being defective with the contractors (tradespeople) or the identification of items that could be either rectified at a later stage or should not be recorded as a defect at all (see Chapter 7.11). The use of experience also allowed stakeholders to alter the way they managed and shared information according to the information management tools that were available to them, and the environment in which they operated within. An example of this was demonstrated by Alan’s use of his mobile phone. Through his experience with working on construction sites, Alan found it difficult to carry around bulky artefacts such as notebooks, inspection lists and schedules to support him with his information management practices. Instead, Alan found it easier to make his mobile phone his primary information management tool whilst he was on-site (see Chapter 7.7).

The level of experience often dictated the number of defective items that were being identified and ultimately had a direct effect on the volume of information that needed to be managed and shared. Stakeholders less experienced in construction (George and Lisa) were able to display behaviours consistent with Josephson and Hammarlund’s (1999) study whereby they were able to identify greater amounts of items which they deemed to be defective. However, these items were not always recorded as being defective as more experienced stakeholders such as Colin and Alan were able to demonstrate Carus’ (1992) concept of experience-guided working. Through this display, and in conjunction with the use of their domain-specific knowledge, the more experienced stakeholders were able to perceive the
previously identified items as being normal and within acceptable range. This was subsequently seen as a positive aspect by the stakeholders as it ultimately sped up the defects inspection process (see Chapter 5.3.2 and 7.3.2).

9.2.4 Personal versus Enterprise Information Management Practices

During the defects inspection process, it was observed that there were multiple information management practices (i.e. the builder’s and architect’s enterprise approach as well as their personalised approach) adopted by the stakeholders. Although stakeholders acknowledged the formal enterprise information management approach enforced by the builders, and tried to comply with it as much as possible, they were often seen relying upon the personalised systems they had been accustomed to.

As the architects were sub-contacted back to the builders for the purpose of conducting the defects inspection process, the task of managing information for them was made that much more challenging. Instead of conforming to their own organisation’s information management practices, the architects were now also required to comply with the builder’s enterprise information management practices. This meant that the architects were now dealing with, and managing at least two different approaches (not including their own) which resulted in additional time spent off-site managing and duplicating data. This issue was highlighted in this study by George who spent additional time updating and maintaining both enterprise information management practices (architects and builders), in addition to his own.

The preference for personalised information management systems during the defect inspection process was highly situational, context-based and constrained (Barreau 1995; Jones et al. 2002; Gwizdka & Chignell 2007). Its use was dependant on a variety of factors. These included: the role and experience of the stakeholder; the short timeframe allocated to the identification of defects; the tools and technologies available and the physical environment (construction site). Furthermore, the use of these personalised systems provided the stakeholders with the opportunity to contextualise and add value to the information they possessed.
In contrast to the works of Gordon et al. (2003) and Chen and Kamara (2011), the use of technology (the tablet) on-site did not assist with the management and sharing of information as the construction company hoped it would. Instead, due to its slow and unreliable nature, it acted as a hindrance and therefore was often discarded by the stakeholders as an information management tool. As an alternative, stakeholders resorted to their own personalised information management and sharing systems they had been accustomed to, even if this meant that they were required to double-handle and duplicate data.

Gwizdka & Chignell (2007) claimed that stakeholders who possessed similar profiles (job and demographics) can exhibit huge differences in their information management behaviour and that these differences can be applied with respect to both the management of paper-based and electronic resources. Within the context of this study, Colin and George were seen as stakeholders who possessed similar profiles. During the defects inspection process they both held similar roles. However, upon closer examination of their personal information management practices, it was revealed that they ultimately had very different systems to code, record and store project-related information.

9.3 Summary

This chapter discussed and summarised the major themes related to the management and sharing of information during a complex construction project process. In total, four major themes were addressed. These included: the complex and iterative nature of the defects inspection process; the central role of knowledge in the management and sharing of information; the role of experience in the management and sharing of information; and finally, the personal versus enterprise information management practices. Each of these themes alone is important in their own right however, together, they are able to provide a deeper understanding of the information management and sharing practices of the stakeholders involved in the defects inspection process. The next and final chapter will re-iterate the context in which the study was conducted and address the contributions to theory and practice. It will also discuss the implications for further research and the research limitations of the study. Finally it will provide a brief summary of the thesis.
10 Conclusion

10.1 Introduction

This study set out to document and explore the information management and sharing practices of a team of stakeholders involved in a complex construction project as they completed the defects inspection process for a purpose-built, innovative, multi-million dollar, academic building for a prominent Australian University. Through the use of an information audit, the study reported upon and mapped the information flows within the defects inspection process and the key factors that play a role in the way the stakeholders managed and shared information. As a result of conducting this study, the findings were able to provide a richness to the understanding of the information management and sharing practices of the stakeholders involved in a complex construction project.

In exploring the information management and sharing practices of the stakeholders involved in the defects inspection process, an analysis and review of the extant literature was conducted (see Chapter Two). The analysis of the literature highlighted a set of themes offering an understanding of the roles that information management and sharing plays within one sector of the construction process, and more specifically, how these themes influenced that process in a variety of ways. The identification of these themes were then combined to form a conceptual framework (Figure 2-2) to enable the case study data from this research to be framed in a way to allow the researcher to make sense of that data, and ultimately assist with the answering the main research question posed in Chapter One:

How is information managed and shared within a complex construction process?

With the following sub-questions:

What role do information management and sharing play within a construction project, in particular the defects inspection process?

What role do knowledge and experience play in the management and sharing of this information?
Using a case study methodology and an interpretive approach enabled the researcher to develop an understanding of the many factors that influenced stakeholders’ information management and sharing practices within the defects inspection process. This methodology relies upon an empathetic and engaged approach guided by awareness that the researcher’s voice must always be distinct from that of the participants. The researcher’s voice can be grounded in the research participants’ experiences and can reflect a shared understanding. Similarly, although the researcher’s understanding of the individual’s social world is inevitably preconceived in part, it is also socially constructed via communication with the participants during the period of the research activity (Burgess-Limerick 1998).

This final chapter begins by addressing the contributions to theory which includes a review of the conceptual frameworks developed at the end of Chapter Two. It will then proceed discuss the implications for practice and future research and conclude by considering the limitations of the study and providing a brief summary of this thesis.
10.2 Contributions to Theory

In order to address this study’s contribution to theory, this section will begin by reviewing the proposed conceptual framework which was determined at the end of the analysis in Chapter Two. The conceptual framework was created in order to provide an evaluative lens to analyse the data collected and reflected what the extant literature was reporting. Figure 9-2 demonstrates the key concepts explored and the central focus of the study, whereas Figure 9-3 provides a more detailed conceptual framework which includes a summary of the major theories and studies relevant to each concept.

Figure 10-1: The conceptual framework from Chapter Two
Figure 10-2: The conceptual framework (including the major theories and studies) from Chapter Two
As a result of conducting the research, it was clear that the basis of any theory underpinning our understanding of a construction process has its origins in knowledge and experience. These are then used by the stakeholders through their work process, either individually through personal information management, or collectively as enterprise information management. Almost universally personal information management and enterprise information management utilise information technology. In addition, the research showed that personal information management practices are informed by individual differences and enterprise information management is informed by organisational differences. Both personal and enterprise information management then become the conduit to the way information is managed and shared in construction processes whereby the strategic aim is to improve efficiency in those processes. The findings also demonstrate that across all the relationships between knowledge and expertise, personal and enterprise information management and sharing are all iterative and accumulative processes.

Within this framework (Figure 9-4) personal and enterprise information management act as an intermediary stage to filter relevant knowledge and experience and apply that to the work processes using information management and information sharing. This theoretical contribution is summarised in Figure 9-4.

With respect to the previous literature identified in Chapter Two, the findings from this study add to the literature surrounding information audits and the causes and costs of defects in construction.

**Information Audits:**

As discussed in Chapter Two, information audits have traditionally been applied in organisations where the results can be used to identify the contribution made by the information to the work of the organisation, and in particular, its importance to information decision making (Dubois 1995). In utilising Henczel’s (2001a) seven-stage information auditing process, this study was able to extend the information audit from an organisational level and adapt it to the individual levels whereby their personal information management practices were documented. Through the comprehension of the stakeholders’ personal information management practices, an
organisation could gain an improved understanding of the type and scope of information their employees possess. This in-turn, provides them with a greater insight into the information that they possess and the ability to make more informed decisions (see Chapter 8).

**Causes and costs in construction:**

Josephson and Hammarlund (1999) reported that stakeholders who possessed limited experience in construction were more likely to be successful in the identification of defects and that more experienced stakeholders tended to perceive some situations as being normal and for that reason, fail to record them as defects. The findings from this study acknowledges that the stakeholders who possess limited experience were able to identify more objects which they deemed to be defective. However, these were not always recorded, as experienced stakeholders were able to incorporate additional factors in their decision making processes. The findings suggests that in contrast Josephson and Hammarlund (1999), experienced stakeholders understood the importance of the time frame in which they operated, and usually made the correct judgement on a defect through the use of their specific domain knowledge and experience-guided working (see Chapter 7).
Figure 10-3: Theoretical framework
10.3 Implications for Practice

The outcomes of this study have identified some implications for practice, where the current research can provide a better understanding of the information management and sharing practices of the organisations and stakeholders working within the construction industry. However, it should be noted that the outcomes of this study are not to provide a solution to the information management and sharing practices within the construction industry, but rather recognise the important role that it plays within construction projects.

10.3.1 Organisational Perspective

From an organisational perspective, the study identified that there needs to be a greater understanding of the information requirements from the different organisations involved (i.e. builders and architects). That is, what information is required by which organisation and when. The study also emphasised the need for a standardised approach in the management and sharing of information (see Chapter Eight). However, this may prove to be a difficult task as the individuals who work in these multi-disciplinary teams are required to comply, not only with the information management and sharing practices of the organisations they are contracted to undertake (in this instance the architects were contracted by the builders), but also the ones specified by their own organisations. Furthermore, due to the competitive nature of the construction industry and the uniqueness of construction projects, organisations might find themselves and their employees working on concurrent projects whereby there are differing requirements in the way information is managed and shared.

The findings from this study also showed that there needs to be a greater understanding of the information flows within a complex construction project. Although this study investigated one process within a construction project, it did identify the many places in which information was seen to be out-dated, double-handled and duplicated. This, in turn, leads to additional time spent by the stakeholders organising and managing the information required for the performance of their duties.
Finally, due to the huge volume of data (i.e. the 15,000 identified defects) being created, updated, disseminated and stored within a complex construction project, organisations and stakeholders need to realise the importance of managing the explicit forms of documentation. There needs to be a greater emphasis placed upon the importance of proper information management and sharing processes. If this is poorly managed, it can provide the organisations and stakeholders incorrect or incomplete information which, in turn, leads to costly re-works and lengthy delays. Furthermore, the incorrectness or incompleteness of this explicit information may leave organisations open to the possibility of litigation (see Chapters 1.2 and 6.3.2).

10.3.2 Personnel Perspective

The research showed that the personnel selected to perform the defects inspection process played a vital role in the timely completion of the inspections. It was observed that in order to successfully manage and share information, personnel (stakeholders) needed to possess a combination of knowledge and experience. Furthermore, consideration must also be given to the composition of the team. For a team to be successful, there needs to be a mixture of experience and knowledge in order to detect as many defects as possible.

In addition, the role of a stakeholder often dictated the way information was managed and shared. The findings indicated that within a team, there needed to be a person who is allocated the task of managing the explicit forms of documentation and if that person is absent, then the team needs to alter the roles in order for another to take charge.

10.3.3 Tools and Technology Perspective

This study also highlights the need for the construction industry to have a greater understanding in the selection of tools and technologies used to assist with the management and sharing of information on construction sites (Chen & Kamara 2011). This implication was highlighted numerous times throughout this study whereby the tablet that was provided by the construction company was pushed aside in preference to the personalised information management practices of the
stakeholders as it was deemed to be too slow and unreliable for its intended purpose (see Chapters Four, Six, Seven and Eight).
10.4 Research Limitations

Research theses are inevitably bound by limitations as researchers are compelled to focus on certain aspects of a particular problem. Given the time and scope of the study, the entire construction process could not be addressed. Therefore, this study was focused on a single team of stakeholders as they performed the task of inspecting a building for defects just before the competition and handover of keys to the client.

As described in Chapter Three, a case study methodology was adopted for this research whereby the questions were framed in regards to the generalisability of the results (Borg & Gall, 1989; and Denscombe, 1998; Yin, 2014). This, in turn, made the findings context-specific. What occurred during the observation sessions with the stakeholders and the organisations involved may not apply in another situation. However, as it has been argued throughout this study, information management and sharing practices of stakeholders within the defects inspection process has not been previously explored. Therefore, this particular case study explored and highlighted the contributing factors of tacit and explicit knowledge, personal and enterprise and information management approaches and experience in the management and sharing of information during the defects inspection process and suggests that they are potentially relevant in other industries and organisations. Furthermore, the objective of qualitative research, and indeed case studies (Chapter 3.4), is not to generalise populations, but rather to generate theory, which could be tested by other researchers in future studies or confirmatory evidence of existing theory (Yin 1994; Lincoln & Guba, Stake 2000 and Creswell 2013).

As a result of not being able to use ethnography as a participant-observer, some of the data has possibly missed some of the richness that could have been gained. To combat the issue of validity, other activities were undertaken in order to facilitate an increase in the validity and reliability of this study (Lincoln & Guba 1985). This included a prolonged engagement with the stakeholders and their respective organisations to learn the ‘culture’, and to test for misinformation introduced by distortions to build trust. Additionally two member checks were performed (see Chapter 3.7).
The entire defects inspection process was completed within 14 weeks. During the second half of this period, the core team of stakeholders were divided into two smaller teams in order to speed up the process. It was acknowledged that the researcher could not be in two locations at the same time to observe both teams. However, the researcher did make a conscious effort to select a variety of defect scenarios (see Chapter Six) in order to ensure the richness and validity of the story. At the conclusion of the defects inspection process, the core stakeholders were also interviewed which enabled a consistent story to be told.

As mentioned in Chapter 3.7, in order to limit this effect, the data collected from the on-site observation sessions involved a prolonged period of interaction (14 weeks) spent with the stakeholder to minimise any abnormal changes in productivity as suggested by Landsberger (1958).

A further limitation of this study was in not being able to interview everyone related to the defects inspection process. As discussed in Chapter Three, a criterion was established in order to select the most appropriate participants. Participants who were invited to participate within this study had to be directly involved in the defect inspections. A process in which stakeholders visually inspected the building for construction and design defects as opposed to the defects rectifications, which involved the physical rectification of items. Consequently, trades people and engineers were excluded from this study. Although there were six stakeholders identified as matching the criteria, not all were interviewed. The reason for this was that the principal architect and project manager were only observed being present once or twice during the inspection period as they were often engaged in other aspects of the building.

One final limitation of this study is the possible bias that not only the researcher brings into the story, but also the bias of each stakeholder interviewed. Kvale (1996 p. 286) argued that ‘personal interaction in the interview may have a decisive impact on the results’. The researcher acknowledges that bias did occur in the stakeholders recounting the information and sharing practices during the defects inspection process. The researcher also acknowledges that some of the stakeholders interviewed recounted their versions with selectivity. It is common in organisational
interviews to expect some of the details of the stories are either deliberately left out or accidently deleted in the telling. However, Chapter 3.7 highlighted the issues of validity, reliability and credibility, to try and minimise the potential bias. Furthermore, the recollection of the defects inspection process as told in Chapters Four through to Eight, was the researcher’s narrative of the events that occurred in this process. It is the researcher’s implementation of the story as told by the stakeholders interviewed.

Through the recognition of these limitations, some of the results should perhaps be regarded as being more suggestive than conclusive. Nevertheless, the study demonstrated the various factors which impacted the stakeholders’ management and information sharing during the defects inspection process. Despite these limitations, this study makes a significant contribution to the literature of information management and sharing within the construction industry – with particular focus on the defects inspection process. Lastly, although this was a single case study and the findings may not be able to be generalised as easily to other construction projects, it did provide an in-depth understanding of how stakeholders managed and shared the information as they cycled through the defects inspection process for a complex construction project.

10.5 Implications for Further Research

In terms of future research, the obvious aspect of taking this study further is to observe the information management and sharing practices of stakeholders involved in different construction projects. This will enable the researcher to further explore the theory with reference to other case studies. It is expected that similar results to those developed in this particular study, and that the information management and sharing practices of stakeholders plays a pivotal role in the defects inspection process.

This study could also be used to generate a set of hypotheses, which can then be tested quantitatively via surveys sent out to a large number of organisations. By utilising a quantitative approach, a greater number of stakeholders involved in the defects inspection process could be approached. Increasing the number of organisations and stakeholders in future studies would be able to increase the
generalisability of the results. This study explored the information management and sharing practices of a team of stakeholders as they completed the defects inspection process for complex construction projects. The current study could be extended in several ways which include the investigation of:

- The stakeholders’ information management and sharing practices within other stages of the construction process such as planning, approval, design, contracting, construction, operation or disposal;
- The stakeholders’ information management and sharing practices within the defects inspection process on other construction projects;
- The impact and use of technology (tablets and mobile phones) to assist stakeholders in the management and sharing of information and;
- How enterprise information management practices could be applied across two or more organisations working on the same project.

By extending the current study, the researcher will be able to provide greater detail and a richer understanding into the information management and sharing practices of stakeholders within the construction industry.
10.6 Conclusion

The central concern of this study was to explore the information management and sharing practices of a team of stakeholders as they completed the defects inspection process for a complex construction project. In order to answer the main research question ‘How is information managed and shared within a complex construction project?’ the identification of the information involved in this process was first required. Through the execution of an information audit the study was able to:

- Map and identify the information flows within the defects inspection process, both internally and relevant to its external environment (see Figure 4-21)
- Identify what information was being supplied, including any gaps, inconsistencies, bottlenecks and duplications (see Figure 4-21 and Chapter 8)
- Work out what information was required to meet the needs of both the organisation and process (see Figure 4-21 and Chapter 8).

The information audit was able to identify seven formal sub-processes from which sixteen lists were generated. These sub-processes were supplemented by an additional sub-process created specifically for this construction project, and an additional eight informal lists were created and maintained by the stakeholders (see Chapter 4).

In establishing what information was involved in the defects inspection process, the focus then shifted towards the factors that contributed to how the process was conducted. Through the earlier review of the extant literature, a conceptual framework (see Chapter 2.8) was established to provide an evaluative lens to make sense of the data collected in this study. In doing so, four major inter-related concepts were identified. These were: tacit and explicit knowledge; personal and enterprise information management; domain-specific knowledge and experience.

In answering the sub-question: ‘What role do experience and knowledge play in the management of this information?’ the key findings from the study have indicated that a stakeholder’s knowledge in any form (tacit, explicit or domain-specific) played an important role in the management and sharing of information. Stakeholders who possessed greater experience and domain-specific knowledge
were able to continually make use of their tacit knowledge as a point of reference and a conflict resolution tool. However, this knowledge was not openly distributed amongst the team unless a similar event reoccurred, or it was specifically asked for by another member of the defects inspection team.

The use of explicit knowledge (in this instance explicit forms of documentation) was more often utilised by less experienced stakeholders as it enabled them to feel a sense of security and, in turn, helped to solve any conflicts that may arise. Furthermore, the use of explicit knowledge enabled stakeholders to deal with the large volume of information presented to them (due to the complex nature of the building) and helped to ensure that they were able to protect themselves from any liabilities.

The concept of domain-specific knowledge, which was closely tied to the use of experience, was able to assist stakeholders in the management and sharing of information in a variety of ways. With regard to tacit knowledge, the concept was seen as being one of the major contributing factors that aided in the process of a stakeholder being able to internalise information to create new tacit knowledge (see Chapter 5.12). The possession of domain-specific knowledge also enabled stakeholders to comprehend both the complex and technical nature of documents often produced within the construction industry. Furthermore, the findings indicated that stakeholders who possessed domain-specific knowledge from more than one domain could act as a conduit between the stakeholders from differing domains. They are able to take on multiple roles in order to facilitate a common dialogue between stakeholders from various domains which, in turn, leads to effective sharing of information.

In terms of the personal and enterprise information management practices, the findings indicated that, although there were enterprise information management practices in place to deal with the complexity of information, these practices were often supplemented by the personal information management strategies adopted by the stakeholders. This also extended to the information management tool (the tablet) provided by the construction company. The findings suggested that although the tablet was intended to save time and data duplication, stakeholders were seen
pushing it aside and making use of their personalised information management systems as the tablet was deemed to be too slow and unreliable for its intended purpose. The findings also revealed that these personal information management strategies differed between the stakeholders, including between those who had a similar profile (job and demographic). These practices were ultimately influenced by individual domain-specific knowledge, experience and the amount of explicit and tacit knowledge possessed.

Although the concept of information management in construction is not new and has been reported in many previous studies, these have focused on the different stages within a construction project. This study has been able to explore the defects inspection process from the perspective of information management and sharing, as opposed to the previously raised issues of human error, quality management and/or the use of technology. In conclusion, and in response to the final sub-question of: ‘What role do information management and sharing play within a construction project, in particular the defects inspection process?’ the findings indicate and acknowledge that what may occur in one defect inspection process might not happen in another; the tools, technologies and people will change from one construction project to the next, but always underpinning it all is information. It is the understanding of how to effectively manage and share this information that enables complex construction projects such as this one to be a success.
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Appendix A: Sample of a Blank Template Used in the Collection of Observation Data

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</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Verifier(s):</th>
</tr>
</thead>
<tbody>
<tr>
<td>Verifier(s):</td>
</tr>
<tr>
<td>&lt;name of person verifying the observation session&gt;</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Notes:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Notes:</td>
</tr>
<tr>
<td>&lt;include any issues, body gestures, questions asked or anything that requires further clarification&gt;</td>
</tr>
</tbody>
</table>
Appendix B: Interview Schedule

General questions

a) What is your role in your organisation?
b) How long have you worked for your current organisation?
c) How long have you worked in this industry?

The defects inspection process:

a) Who is typically involved in the defects inspection process?
b) What was your role in the defects inspection process?
c) In your own words, can you please describe or illustrate the defects inspection process?
d) In your own words, can you please describe or illustrate your approach to the defects inspection process?
e) Do you think that managing and sharing information assisted you in defecting the building? If so how?

Tacit and explicit knowledge:

a) In comparing your use of tacit and explicit knowledge while inspecting the building, which one did you think you made use of more?
b) Did the tacit knowledge that you already possess assist you with defecting the building quicker?
c) How important is the documentation and how often did you refer back to them?
d) Which forms of explicit forms of documentation (schedules, defects inspection lists, drawings…) did you use most? Why?

Experience and domain-specific knowledge:

a) Have you completed any other defects inspections prior to this one? If so how many?
b) Do you think the use of your experience assisted you in the defects inspection process?
c) Do you think the use of your domain-specific knowledge assist you in the defects inspection process?
d) Can you please provide an example whereby you made use of your experience whilst conducting the defects inspection process?
e) Can you please provide an example whereby you made use of your domain-specific knowledge whilst conducting the defects inspection process?

Personal and enterprise information management:

a) Can you please explain how your organisation manages their information with respects to the defects inspection list?
b) Is the way you managed information on this project different to that of your own organisation?
c) Can you please describe how you manage your personal information whilst you conducted the defects inspection?
d) Can you please describe what you use to manage and share information whilst you are on site?

e) Are there any specific methods you use to manage your information? i.e. record, code or store?

f) Do you think there was any difference in the way you managed your information in comparison to that of the others involved in the process?
Appendix C: Sample Builder’s Defect Inspection List (Level 3)
## DEFECTS INSPECTION

### Appendix C: Sample Builder's Defect Inspection List (Level 3)

**By Location - Detailed (with Drawings)**

<table>
<thead>
<tr>
<th>Defect No</th>
<th>Room</th>
<th>Area, Subarea &amp; Orientation, Position</th>
<th>Passed</th>
<th>Comments (Objected)</th>
<th>Contractor</th>
<th>Completed</th>
<th>Inspection Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>2140</td>
<td>3.012 Student Commons</td>
<td>Ceiling Finishes - Pressed Metal Ceiling, Ext - Upper</td>
<td>No</td>
<td>Requires Clean</td>
<td>Made on panel near lower state</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2138</td>
<td>3.012 Student Commons</td>
<td>Floor Finishes - Polished Concrete Slab</td>
<td>No</td>
<td>Requires Clean</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2139</td>
<td>3.012 Student Commons</td>
<td>Floor Finishes - Polished Concrete Slab</td>
<td>No</td>
<td>Requires Clean</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2141</td>
<td>3.012 Student Commons</td>
<td>Misc - Fittings</td>
<td>No</td>
<td>Requires Clean</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2142</td>
<td>3.012 Student Commons</td>
<td>Partition Walls - Paneling Panels</td>
<td>No</td>
<td>Requires Clean</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1123</td>
<td>3.013 Study L</td>
<td>Ceiling Finishes - Paneling</td>
<td>No</td>
<td>Requires Cleaning</td>
<td>Hole near light fitting</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1126</td>
<td>3.013 Study L</td>
<td>Partition Walls - Skirting</td>
<td>No</td>
<td>Requires Cleaning</td>
<td>Painting not Even</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1124</td>
<td>3.013 Study L</td>
<td>Windows - Fixed Panel Frame, North</td>
<td>No</td>
<td>Requires Cleaning</td>
<td>Missing Two frame sections missing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1125</td>
<td>3.013 Study L</td>
<td>Windows - Fixed Panel Frame</td>
<td>No</td>
<td>Requires Cleaning</td>
<td>All window edges</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1122</td>
<td>3.041 3D Project</td>
<td>Ceiling Finishes - Paneling</td>
<td>No</td>
<td>Requires Cleaning</td>
<td>Touch up around fittings</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1128</td>
<td>3.041 3D Project</td>
<td>Ceiling Services - Fire Sprinkler</td>
<td>No</td>
<td>Requires Cleaning</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2229</td>
<td>3.041 3D Project</td>
<td>Concrete Column - Misc</td>
<td>No</td>
<td>Requires Cleaning</td>
<td>Alcove Patch paint behind column</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1417</td>
<td>3.041 3D Project</td>
<td>Fixtures &amp; Fittings - Whiteboard, South</td>
<td>No</td>
<td>Requires Cleaning</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1133</td>
<td>3.041 3D Project</td>
<td>Misc - Misc</td>
<td>No</td>
<td>Requires Cleaning</td>
<td>Patch holes from removed whiteboard brackets</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Date:** DD/MM/00

**Signature:**

---

Information Management and Sharing Practices within a Construction Project Process

Huan Cong Vo-Tran

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## Appendix C: Sample Builder’s Defect Inspection List (Level 3)

### DEFECTS INSPECTION

By Location - Detailed (with Drawings)
Filter: (inspcoid = ) And Area Contains “Level 03”, Ignoring Case

<table>
<thead>
<tr>
<th>Defect No</th>
<th>Room</th>
<th>Area, Subarea &amp; Orientation, Position</th>
<th>Passed</th>
<th>Comments (Defect)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1135</td>
<td>3.041 33 Project</td>
<td>Partition Walls - Painting</td>
<td>No</td>
<td>Incomplete - All Coatings missing</td>
</tr>
<tr>
<td>1134</td>
<td>3.041 33 Project</td>
<td>Partition Walls - Painting, South</td>
<td>No</td>
<td>Requires Cleaning - Misc finishes on south wall</td>
</tr>
<tr>
<td>1137</td>
<td>3.041 33 Project</td>
<td>Partition Walls - Painting</td>
<td>No</td>
<td>Requires an Additional Coat - Exterior at Arco will need to be white</td>
</tr>
<tr>
<td>1130</td>
<td>3.041 33 Project</td>
<td>Partition Walls - Painting, North - Left</td>
<td>No</td>
<td>Requires an Additional Coat</td>
</tr>
<tr>
<td>1131</td>
<td>3.041 33 Project</td>
<td>Partition Walls - Painting, East</td>
<td>No</td>
<td>Requires an Additional Coat</td>
</tr>
<tr>
<td>1279</td>
<td>2.220 Corridor</td>
<td>Ceiling Surfaces - Fire Sprinklers</td>
<td>No</td>
<td>Sprinkler Hanger to be black</td>
</tr>
<tr>
<td>2000</td>
<td>2.220 Corridor</td>
<td>Door &amp; Frames - Door</td>
<td>No</td>
<td>Misc - Final paint to all doors &amp; frames</td>
</tr>
<tr>
<td>2092</td>
<td>2.220 Corridor</td>
<td>Door &amp; Frames - Door, South</td>
<td>No</td>
<td>Misc - Hinges missing, doors, etc. missing</td>
</tr>
<tr>
<td>2093</td>
<td>3.220 Corridor</td>
<td>Floor Finishes - Polished Concrete</td>
<td>No</td>
<td>Requires Cleaning - Remove yellow spray paint</td>
</tr>
<tr>
<td>1257</td>
<td>3.220 Corridor</td>
<td>Misc - Mic</td>
<td>No</td>
<td>False panel missing</td>
</tr>
<tr>
<td>1380</td>
<td>3.220 Corridor</td>
<td>Partition Walls - Painting, East - Upper</td>
<td>No</td>
<td>Requires Cleaning - Remove overspray from timber panels</td>
</tr>
<tr>
<td>1382</td>
<td>3.220 Corridor</td>
<td>Partition Walls - Painting, East</td>
<td>No</td>
<td>Requires an Additional Coat</td>
</tr>
<tr>
<td>2091</td>
<td>3.220 Corridor</td>
<td>Partition Walls - Painting</td>
<td>No</td>
<td>Requires an Additional Coat - Glass bead of paint missing at top of wall and long folded ceiling but not door</td>
</tr>
<tr>
<td>1258</td>
<td>2.220 Corridor</td>
<td>Windows - Glass</td>
<td>No</td>
<td>Glass Broken</td>
</tr>
<tr>
<td>1591</td>
<td>3.400 33 Project</td>
<td>Ceiling Surfaces - Light</td>
<td>No</td>
<td>Missing - Replaced light fixtures missing</td>
</tr>
</tbody>
</table>

Date: / / 20/

Signature:

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Information Management and Sharing Practices within a Construction Project Process
Huan Cong Vo-Tran
### Appendix C: Sample Builder’s Defect Inspection List (Level 3)

#### DEFECTS INSPECTION

**By Location – Detailed (with Drawings)**

Filter: (inspcompid = ) And Area Contains "Level 03", Ignoring Case

<table>
<thead>
<tr>
<th>Defect No</th>
<th>Room</th>
<th>Item, Subitem &amp; Orientation, Position</th>
<th>Passed</th>
<th>Comments (Defect)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1226</td>
<td>3.406 Airtlock</td>
<td>Clean - Clean</td>
<td>No</td>
<td>General clean required. Remove paint spots from floor, tiles and sanitary fixtures</td>
</tr>
<tr>
<td>1227</td>
<td>3.406 Airtlock</td>
<td>Clean - Clean</td>
<td>No</td>
<td>General clean required. Remove paint spots from floor, tiles and sanitary fixtures</td>
</tr>
<tr>
<td>1229</td>
<td>3.406 Airtlock</td>
<td>Door &amp; Frames - Paint to door</td>
<td>No</td>
<td>Requires painting. Final glass film required.</td>
</tr>
<tr>
<td>1226</td>
<td>3.405 Airtlock</td>
<td>Door &amp; Frames - Paint to door frame</td>
<td>No</td>
<td>Misc. Remove overspray.</td>
</tr>
<tr>
<td>1227</td>
<td>3.405 Airtlock</td>
<td>Partition Walls - Misc</td>
<td>No</td>
<td>Finish grout around mamps.</td>
</tr>
<tr>
<td>1231</td>
<td>3.408 Airtlock</td>
<td>Partition Walls - Misc</td>
<td>No</td>
<td>Clean excess grout from tiles throughout wall back.</td>
</tr>
<tr>
<td>850</td>
<td>3.405 Airtlock</td>
<td>Partition Walls - Painting</td>
<td>No</td>
<td>Misc.</td>
</tr>
<tr>
<td>1593</td>
<td>3.407 Female WC</td>
<td>Electrical - Sidelights</td>
<td>No</td>
<td>Install recessed light where missing.</td>
</tr>
<tr>
<td>1591</td>
<td>3.407 Female WC</td>
<td>Ties - Wall Ties</td>
<td>No</td>
<td>Holes in grout.</td>
</tr>
<tr>
<td>1592</td>
<td>3.407 Female WC</td>
<td>Ties - Wall Ties</td>
<td>No</td>
<td>Misc. Clean excess grout from tiles.</td>
</tr>
</tbody>
</table>

**Location: East Zone**

**Contractor**

**Completed**

**Inspection Ceremony**

Date: / /20

Signature: 

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### Appendix C: Sample Builder’s Defect Inspection List (Level 3)

#### DEFECTS INSPECTION

<table>
<thead>
<tr>
<th>Building</th>
<th>Area</th>
<th>Location</th>
<th>Defect No</th>
<th>Room</th>
<th>Finish, Surface &amp; Condition, Position</th>
<th>Passed</th>
<th>Comments (Defects)</th>
<th>Construction</th>
<th>Considered</th>
<th>Inspection Company</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>North Zone</td>
<td>1041</td>
<td>3.010</td>
<td>3.010-36</td>
<td>Convexional</td>
<td>No</td>
<td>Mic</td>
<td>(no 6-66 panels req)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1042</td>
<td>3.010</td>
<td>3.010-36</td>
<td>Convexional</td>
<td>No</td>
<td>clean, back wood, carpet &amp; interior</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1043</td>
<td>3.010</td>
<td>3.010-36</td>
<td>Convexional</td>
<td>No</td>
<td>clean, back wood, carpet &amp; interior</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1037</td>
<td>3.010</td>
<td>3.010-36</td>
<td>Convexional</td>
<td>No</td>
<td>Required Cleaning</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1044</td>
<td>3.010</td>
<td>3.010-36</td>
<td>Convexional</td>
<td>No</td>
<td>Clean paint overspray</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1045</td>
<td>3.010</td>
<td>3.010-36</td>
<td>Convexional</td>
<td>No</td>
<td>Remove paint overspray</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1046</td>
<td>3.010</td>
<td>3.010-36</td>
<td>Convexional</td>
<td>No</td>
<td>Paint all internal</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1039</td>
<td>3.010</td>
<td>3.010-36</td>
<td>Convexional</td>
<td>No</td>
<td>Joints not acceptable</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1038</td>
<td>3.010</td>
<td>3.010-36</td>
<td>Convexional</td>
<td>No</td>
<td>Painting not Even</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2104</td>
<td>3.210</td>
<td>3.210-36</td>
<td>Checker</td>
<td>No</td>
<td>Misc</td>
<td>(no 6-66 panels req)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1233</td>
<td>3.210</td>
<td>3.210-36</td>
<td>Checker</td>
<td>No</td>
<td>Concrete receive touch up</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2117</td>
<td>3.210</td>
<td>3.210-36</td>
<td>Checker</td>
<td>No</td>
<td>Paint pipe clip black</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2101</td>
<td>3.210</td>
<td>3.210-36</td>
<td>Checker</td>
<td>No</td>
<td>Clean door hardware, roller shutter door</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2099</td>
<td>3.210</td>
<td>3.210-36</td>
<td>Door &amp; Frames</td>
<td>No</td>
<td>Finish not acceptable</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Date: __/__/____
Signature: ____________

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# Appendix C: Sample Builder's Defect Inspection List (Level 3)

**DEFECTS INSPECTION**

**By Location - Detailed (with Drawings)**

Filter: (inspcmpid = ) And Area Contains 'level 03', Ignoring Case

**Building:**

<table>
<thead>
<tr>
<th>Defect No</th>
<th>Room</th>
<th>Meta, Details &amp; Verification, Position</th>
<th>Passed</th>
<th>Comments (Defect)</th>
<th>Contractor</th>
<th>Completed</th>
<th>Inspection Company</th>
</tr>
</thead>
<tbody>
<tr>
<td>2105</td>
<td>3.216 Exactor</td>
<td>Door &amp; Frames - Sliding Door</td>
<td>No</td>
<td>Misc Incomplete</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2110</td>
<td>3.216 Exactor</td>
<td>Floor Finishes - Carpet Tiles</td>
<td>No</td>
<td>Missing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1230</td>
<td>3.216 Exactor</td>
<td>Floor Finishes - Misc</td>
<td>No</td>
<td>Escavator threshold missing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2105</td>
<td>3.216 Exactor</td>
<td>Joinery - Misc</td>
<td>No</td>
<td>Incomplete</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1230</td>
<td>3.216 Exactor</td>
<td>Misc - Misc</td>
<td>No</td>
<td>Clear glass from cable tray</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2110</td>
<td>3.216 Exactor</td>
<td>Misc - Misc, East</td>
<td>No</td>
<td>Misc</td>
<td>Remove hook from wall</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2112</td>
<td>3.216 Exactor</td>
<td>Misc - Misc</td>
<td>No</td>
<td>seal pipe perspex wall</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2113</td>
<td>3.216 Exactor</td>
<td>Misc - Misc</td>
<td>No</td>
<td>seal pipe perspex wall</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2105</td>
<td>3.216 Exactor</td>
<td>Misc - Paint, North - Upper</td>
<td>No</td>
<td>Control require paint</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2105</td>
<td>3.216 Exactor</td>
<td>Misc - Paint, North - Upper</td>
<td>No</td>
<td>Control require paint</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2119</td>
<td>3.216 Exactor</td>
<td>Misc - Paint</td>
<td>No</td>
<td>Misc</td>
<td>Paint feature theatre basin and black</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2114</td>
<td>3.216 Exactor</td>
<td>Partition Walls - Misc</td>
<td>No</td>
<td>Incomplete</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2102</td>
<td>3.216 Exactor</td>
<td>Partition Walls - Painting, West - Lower</td>
<td>No</td>
<td>Finish Eleven</td>
<td>Artificial joinery</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2107</td>
<td>3.216 Exactor</td>
<td>Partition Walls - Painting</td>
<td>No</td>
<td>Finish Eleven</td>
<td>Residence wall on stair 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2103</td>
<td>3.216 Exactor</td>
<td>Partition Walls - Painting, West - Upper</td>
<td>No</td>
<td>Paint Popby</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2115</td>
<td>3.216 Exactor</td>
<td>Partition Walls - Painting</td>
<td>No</td>
<td>Requires Cleaning</td>
<td>Tidy up paint &amp; thermais &amp; residence wall</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2103</td>
<td>3.216 Exactor</td>
<td>Partition Walls - Painting</td>
<td>No</td>
<td>Requires an Additional Cost</td>
<td>Block for pickup delivery north &amp; east budlehead and residence wall as per markup</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Location:** North Zone

**Date:** __/__/20

**Signature:** ___

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### DEFECTS INSPECTION

By Location - Detailed (with Drawings)
Filter: (isacompind == ) And Area Contains "level 03", Ignoring Case

<table>
<thead>
<tr>
<th>Defect No</th>
<th>Room</th>
<th>Item, SubItem &amp; Generation, Position</th>
<th>Passed</th>
<th>Comments (Defect)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2604</td>
<td>3.217 Feyer</td>
<td>Ceiling Finishes - Painting, South - Upper</td>
<td>No</td>
<td>Finish Error, Poor finish - request retreatment</td>
</tr>
<tr>
<td>2602</td>
<td>3.217 Feyer</td>
<td>Ceiling Finishes - Painting, South - Upper</td>
<td>No</td>
<td>Finish Error, Poor finish - repair needed</td>
</tr>
<tr>
<td>1325</td>
<td>3.217 Feyer</td>
<td>Ceiling Finishes - Painting</td>
<td>No</td>
<td>Requires additional cost, Touch up around access panel</td>
</tr>
<tr>
<td>2607</td>
<td>3.217 Feyer</td>
<td>Ceiling Finishes - Painting</td>
<td>No</td>
<td>Touch up ceiling paintwork, Neatness junction to mid sheathing &amp; touch up paint</td>
</tr>
<tr>
<td>2607</td>
<td>3.217 Feyer</td>
<td>Crown - Clean</td>
<td>No</td>
<td>General clean required, Service caps on external area</td>
</tr>
<tr>
<td>2605</td>
<td>3.217 Feyer</td>
<td>Door &amp; Frames - Paint to door</td>
<td>No</td>
<td>Requires painting</td>
</tr>
<tr>
<td>2609</td>
<td>3.217 Feyer</td>
<td>Floor Finishes - Bluestone</td>
<td>No</td>
<td>Mid-grade joints</td>
</tr>
<tr>
<td>2608</td>
<td>3.217 Feyer</td>
<td>Floor finishes - Misc, North</td>
<td>No</td>
<td>Concrete exposed to boardwork, confirm final finish</td>
</tr>
<tr>
<td>2606</td>
<td>3.217 Feyer</td>
<td>Misc - Fillings</td>
<td>No</td>
<td>Bledstain missing</td>
</tr>
<tr>
<td>2608</td>
<td>3.217 Feyer</td>
<td>Misc - Misc</td>
<td>No</td>
<td>Misc - remove rubber from cuchi tray</td>
</tr>
<tr>
<td>2607</td>
<td>3.217 Feyer</td>
<td>Misc - Misc, Up</td>
<td>No</td>
<td>Remove temp power wall boxes, Arrangement near skylights</td>
</tr>
<tr>
<td>2609</td>
<td>3.217 Feyer</td>
<td>Misc - Misc</td>
<td>No</td>
<td>Clean up wiring, Above ductwork</td>
</tr>
<tr>
<td>2606</td>
<td>3.217 Feyer</td>
<td>Partition Walls - Painting</td>
<td>No</td>
<td>Requires additional cost, Black band at top missing</td>
</tr>
<tr>
<td>2609</td>
<td>3.217 Feyer</td>
<td>Partition Walls - Plaster, East - Lower</td>
<td>No</td>
<td>Requires patching, At base of wall next to project room door</td>
</tr>
</tbody>
</table>

Date: __/__/20__

Signature:

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### DEFECTS INSPECTION

**By Location - Detailed (with Drawings)**

Filter: `inspcorpid = ` And Area Contains 'Level 03', Ignoring Case

<table>
<thead>
<tr>
<th>Defect No</th>
<th>Area</th>
<th>Item, Subitem &amp; Orientation, Position</th>
<th>Passed</th>
<th>Comments (Defect)</th>
<th>Contractor</th>
<th>Completed</th>
<th>Inspection Company</th>
</tr>
</thead>
<tbody>
<tr>
<td>2061</td>
<td>3.217</td>
<td>Foyer, Partition Walls - Plantr,East</td>
<td>No</td>
<td>Requires Fixing</td>
<td>As requested</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>2033</td>
<td>3.217</td>
<td>Foyer, Partition Walls - Storng,East</td>
<td>No</td>
<td>Painting not Even</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Date:__/__/20_  
Signature: ____________________________

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## Appendix C: Sample Builder’s Defect Inspection List (Level 3)

### Defects Inspection

By Location - Detailed (with Drawings)

Filter: (inspcompid ~ ) And Area Contains “level 03”, Ignoring Casas

<table>
<thead>
<tr>
<th>Building</th>
<th>Location: South Zone</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Date</th>
<th>Comments (Defect)</th>
<th>Contractor</th>
<th>Completed</th>
<th>Inspection Company</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Touch Up Around Fittings Around grile</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Escalators hanging down</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>New office doors</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fix painter around projector pole</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Carpet Missing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Insulation by fascia</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Foam</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mica</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Paint</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mica</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Paint</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Requires an Additional Cost</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Interior</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Touch up ceiling paintwork</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>At bullnose</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Requires Patching</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Around light fitting</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Requires Patching</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Around socket</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Requires Touch Up Paint</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Block out sprinkler pipe clips</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Clean</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Glue and nail on carpet</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Date: / / 2000

Signature: __________________

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## DEFECTS INSPECTION

**By Location - Detailed (with Drawings)**

*Filter: (Inspection = ) And Area Contains 'Level 03', Ignoring Case*

<table>
<thead>
<tr>
<th>Defect No</th>
<th>Room</th>
<th>Item, Subitem &amp; Orientation, Position</th>
<th>Passed</th>
<th>Comments (Defect)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1163</td>
<td>3.015 S5 Lectoral</td>
<td>Clean, Clean</td>
<td>No</td>
<td>Clean carpet, Missing patch and indentations throughout</td>
</tr>
<tr>
<td>1166</td>
<td>3.015 S5 Lectoral</td>
<td>Clean, Clean</td>
<td>No</td>
<td>Clean carpet, Staining around jamb at front</td>
</tr>
<tr>
<td>1167</td>
<td>3.015 S5 Lectoral</td>
<td>Clean, Clean</td>
<td>No</td>
<td>Clean carpet, Staining around jamb at front</td>
</tr>
<tr>
<td>867</td>
<td>3.015 S5 Lectoral</td>
<td>Clean, Clean</td>
<td>No</td>
<td>General clean required</td>
</tr>
<tr>
<td>1149</td>
<td>3.015 S5 Lectoral</td>
<td>Clean, Clean, South</td>
<td>No</td>
<td>Clean plus one carpet wall trim</td>
</tr>
<tr>
<td>1154</td>
<td>3.015 S5 Lectoral</td>
<td>Door, Frames - Door</td>
<td>No</td>
<td>Colour patchy</td>
</tr>
<tr>
<td>1168</td>
<td>3.015 S5 Lectoral</td>
<td>Door, Frames - Misc</td>
<td>No</td>
<td>Door cylinder missing</td>
</tr>
<tr>
<td>1147</td>
<td>3.015 S5 Lectoral</td>
<td>Fixtures &amp; Fittings - AV Panel</td>
<td>No</td>
<td>Missing, Air equipment</td>
</tr>
<tr>
<td>1151</td>
<td>3.015 S5 Lectoral</td>
<td>Fixtures &amp; Fittings - Light Switches</td>
<td>No</td>
<td>Coverplate not installed</td>
</tr>
<tr>
<td>1161</td>
<td>3.015 S5 Lectoral</td>
<td>Fixtures &amp; Fittings - Projector</td>
<td>No</td>
<td>Black out pole</td>
</tr>
<tr>
<td>1152</td>
<td>3.015 S5 Lectoral</td>
<td>Fixtures &amp; Fittings - Whiteboard, North</td>
<td>No</td>
<td>Damaged</td>
</tr>
<tr>
<td>1164</td>
<td>3.015 S5 Lectoral</td>
<td>Floor Finish - Broadloom Carpet, East</td>
<td>No</td>
<td>Misc, Finish around concrete column</td>
</tr>
<tr>
<td>1165</td>
<td>3.015 S5 Lectoral</td>
<td>Floor Finish - Broadloom Carpet, West - Lower</td>
<td>No</td>
<td>Misc, Finish carpet at Av cpd and at shifting edges</td>
</tr>
<tr>
<td>1162</td>
<td>3.015 S5 Lectoral</td>
<td>Misc - Misc, South</td>
<td>No</td>
<td>Remove temp power outlets</td>
</tr>
<tr>
<td>2233</td>
<td>3.015 S5 Lectoral</td>
<td>Patched Walls - Painting</td>
<td>No</td>
<td>Paint AV cpd internal</td>
</tr>
<tr>
<td>1148</td>
<td>3.015 S5 Lectoral</td>
<td>Patched Walls - Painting, East - Lower</td>
<td>No</td>
<td>Requires an Additional Cost</td>
</tr>
</tbody>
</table>

**Date:** / /20

**Signature:**

---

**Information Management and Sharing Practices within a Construction Project Process**

Huan Cong Vo-Tran
### Appendix C: Sample Builder’s Defect Inspection List (Level 3)

**DEFECTS INSPECTION**

By Location - Detailed (with Drawings)

Filter: (inspcoid = ) And Area Contains "level 03", Ignoring Case

<table>
<thead>
<tr>
<th>Building No.</th>
<th>Room</th>
<th>Item, Subitem &amp; Orientation, Position</th>
<th>Passed</th>
<th>Comments (Unref)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1155</td>
<td>3.015 SE Leedton</td>
<td>Partition Walls - Painting, North</td>
<td>No</td>
<td>Requires an Additional Coat</td>
</tr>
<tr>
<td>1155</td>
<td>3.015 SE Leedton</td>
<td>Partition Walls - Plaster, North</td>
<td>No</td>
<td>Finish not Even</td>
</tr>
<tr>
<td>1156</td>
<td>3.015 SE Leedton</td>
<td>Partition Walls - Plaster, East</td>
<td>No</td>
<td>Requires Polishing</td>
</tr>
<tr>
<td>1156</td>
<td>3.015 SE Leedton</td>
<td>Windows - Fixed Panel Frame</td>
<td>No</td>
<td>Finish not Acceptable</td>
</tr>
<tr>
<td>1412</td>
<td>3.016 Student Commons</td>
<td>Ceiling Finishes - Painting, West - Upper</td>
<td>No</td>
<td>Touch up ceiling paintwork</td>
</tr>
<tr>
<td>2153</td>
<td>3.016 Student Commons</td>
<td>Floor Finishes - Polished Concrete Screed</td>
<td>No</td>
<td>Finish Unacceptable. Bullnose tread face</td>
</tr>
<tr>
<td>2152</td>
<td>3.016 Student Commons</td>
<td>Floor Finishes - Polished Concrete Screed</td>
<td>No</td>
<td>Finish Unacceptable. Bullnose tread face</td>
</tr>
<tr>
<td>1418</td>
<td>3.016 Student Commons</td>
<td>Floor Finishes - Polished Concrete Screed</td>
<td>No</td>
<td>Requires Clean. Clean six cuts and caulk</td>
</tr>
<tr>
<td>2143</td>
<td>3.016 Student Commons</td>
<td>Floor Finishes - Polished Concrete Screed, South</td>
<td>No</td>
<td>Requires Clean. Remove paint from windows at base</td>
</tr>
<tr>
<td>388</td>
<td>3.016 Student Commons</td>
<td>Floor Finishes - Rubber</td>
<td>No</td>
<td>Missing</td>
</tr>
<tr>
<td>1402</td>
<td>3.016 Student Commons</td>
<td>Jambery - Base Top</td>
<td>No</td>
<td>Bendtype Missing. And sealing</td>
</tr>
<tr>
<td>2147</td>
<td>3.016 Student Commons</td>
<td>Misc - Fixings</td>
<td>No</td>
<td>Install cover</td>
</tr>
<tr>
<td>2154</td>
<td>3.016 Student Commons</td>
<td>Misc - Fixings, South - Right</td>
<td>No</td>
<td>Tighten balustrade connection</td>
</tr>
<tr>
<td>2155</td>
<td>3.016 Student Commons</td>
<td>Misc - Misc</td>
<td>No</td>
<td>Decor to siding door</td>
</tr>
</tbody>
</table>

Date: _/__/2020_  
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### Appendix C: Sample Builder’s Defect Inspection List (Level 3)

#### DEFECTS INSPECTION

**By Location – Detailed (with Drawings)**

Filter: `inspcorpId = ` And Area Contains "level 03", ignoring Case

<table>
<thead>
<tr>
<th>Defect No</th>
<th>Area, Defect, Location</th>
<th>Item, SubItem &amp; Orientation, Position</th>
<th>Passed</th>
<th>Comments (Defect)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1404</td>
<td>3.016 Student Commons</td>
<td>Misc - Paint, East</td>
<td>No</td>
<td>Misc - Paint to handrail</td>
</tr>
<tr>
<td>2146</td>
<td>3.016 Student Commons</td>
<td>Partition Walls - Painting, West</td>
<td>No</td>
<td>Requires an Additional Cost - No cost required</td>
</tr>
<tr>
<td>2148</td>
<td>3.016 Student Commons</td>
<td>Partition Walls - Painting, East</td>
<td>No</td>
<td>Requires an Additional Cost - Repaint entire wall left of entrance</td>
</tr>
<tr>
<td>2150</td>
<td>3.016 Student Commons</td>
<td>Partition Walls - Painting, East</td>
<td>No</td>
<td>Requires Polishing System G/P outlets</td>
</tr>
<tr>
<td>2151</td>
<td>3.016 Student Commons</td>
<td>Windows - Fixed Panel Frame, North</td>
<td>No</td>
<td>Requires Cleaning - Remove paint overspray from all frames</td>
</tr>
<tr>
<td>2156</td>
<td>3.016 Student Commons</td>
<td>Windows - Fixed Panel Frame, North</td>
<td>No</td>
<td>Requires Cleaning - Remove stickers from sliding door glazing</td>
</tr>
<tr>
<td>1297</td>
<td>3.016 Student Commons</td>
<td>Windows - Glass</td>
<td>No</td>
<td>Requires Cleaning</td>
</tr>
<tr>
<td>2144</td>
<td>3.016 Student Commons</td>
<td>Windows - Misc</td>
<td>No</td>
<td>Operable window flyscreen</td>
</tr>
<tr>
<td>1399</td>
<td>3.016 Student Commons</td>
<td>Windows - Mullions</td>
<td>No</td>
<td>Requires cleaning</td>
</tr>
<tr>
<td>1183</td>
<td>3.017 Study &amp; Learning</td>
<td>Ceiling Finishes - Aluminium Soffit Lining</td>
<td>No</td>
<td>Misc - Remove plastic tape from borders</td>
</tr>
<tr>
<td>1429</td>
<td>3.017 Study &amp; Learning</td>
<td>Concrete Column - Misc, North - Lower</td>
<td>No</td>
<td>Misc - Remove screws</td>
</tr>
<tr>
<td>1176</td>
<td>3.017 Study &amp; Learning</td>
<td>Concrete Column - Paint</td>
<td>No</td>
<td>Requires Cleaning</td>
</tr>
</tbody>
</table>

**Date:** / /00

**Signature:**

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## Appendix C: Sample Builder’s Defect Inspection List (Level 3)

### DEFECTS INSPECTION

**By Location - Detailed (with Drawings)**

Filter: (Inspcomplid = ) And Area Contains "level 03", Ignoring Case

<table>
<thead>
<tr>
<th>Defect No</th>
<th>Room</th>
<th>Item, Subitem &amp; Orientation, Position</th>
<th>Passed</th>
<th>Comments (Defect)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1181</td>
<td>3.0.7 Study &amp; Learning</td>
<td>Curtain Walling - Timber Panels</td>
<td>No</td>
<td>Missing</td>
</tr>
<tr>
<td>1174</td>
<td>3.0.7 Study &amp; Learning</td>
<td>Door &amp; Frames - Sliding Door</td>
<td>No</td>
<td>Finishes not acceptable; clean up sliding track and threshold junction</td>
</tr>
<tr>
<td>1176</td>
<td>3.0.7 Study &amp; Learning</td>
<td>Door &amp; Frames - Sliding Door</td>
<td>No</td>
<td>Miter End caps to sliding door track</td>
</tr>
<tr>
<td>1175</td>
<td>3.0.7 Study &amp; Learning</td>
<td>Door &amp; Frames - Sliding Door</td>
<td>No</td>
<td>Miter Handle missing</td>
</tr>
<tr>
<td>1180</td>
<td>3.0.7 Study &amp; Learning</td>
<td>Door &amp; Frames - Sliding Door</td>
<td>No</td>
<td>Requires Cleaning</td>
</tr>
<tr>
<td>1179</td>
<td>3.0.7 Study &amp; Learning</td>
<td>Misc - Fixings</td>
<td>No</td>
<td>Blinds missing</td>
</tr>
<tr>
<td>1171</td>
<td>3.0.7 Study &amp; Learning</td>
<td>Misc - Miter, Up</td>
<td>No</td>
<td>Insulation/bu/brad &amp; shib Fix</td>
</tr>
<tr>
<td>2234</td>
<td>3.0.7 Study &amp; Learning</td>
<td>Partition Walls - Painting</td>
<td>No</td>
<td>Prim AV eol internal</td>
</tr>
<tr>
<td>1172</td>
<td>3.0.7 Study &amp; Learning</td>
<td>Partition Walls - Painting, South</td>
<td>No</td>
<td>Prim Patchy Print to wall</td>
</tr>
<tr>
<td>1173</td>
<td>3.0.7 Study &amp; Learning</td>
<td>Partition Walls - Painting, East - Lower</td>
<td>No</td>
<td>Prim Patchy</td>
</tr>
<tr>
<td>1177</td>
<td>3.0.7 Study &amp; Learning</td>
<td>Partition Walls - Painting, North - Lower</td>
<td>No</td>
<td>Prim Patchy</td>
</tr>
<tr>
<td>1184</td>
<td>3.0.8 Slams</td>
<td>Ceiling Services - Fire Sprinkler</td>
<td>No</td>
<td>Blackout spigotter pipe clips</td>
</tr>
<tr>
<td>1192</td>
<td>3.0.8 Slams</td>
<td>Ceiling Services - Light</td>
<td>No</td>
<td>Escutcheons hanging down</td>
</tr>
<tr>
<td>1183</td>
<td>3.0.8 Slams</td>
<td>Concrete Columns - Paint</td>
<td>No</td>
<td>Requires Cleaning</td>
</tr>
</tbody>
</table>

Date: ___/___/___  
Signature: 

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## DEFECTS INSPECTION

By Location - Detailed (with Drawings)
Filter: (incompuid = ) And Area Contains "level 03", Ignoring Case

<table>
<thead>
<tr>
<th>Building</th>
<th>Area: Level 03</th>
<th>Location: South Zone</th>
<th>[Comments] (Defect)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1197</td>
<td>3.018 Stairs</td>
<td>Door &amp; Frames - Misc, West</td>
<td>No</td>
</tr>
<tr>
<td>1199</td>
<td>3.018 Stairs</td>
<td>Door &amp; Frames - Misc, West</td>
<td>No</td>
</tr>
<tr>
<td>1198</td>
<td>3.018 Stairs</td>
<td>Fixtures &amp; Fittings - AV Panel</td>
<td>No</td>
</tr>
<tr>
<td>1155</td>
<td>3.018 Stairs</td>
<td>Fixtures &amp; Fittings - Sink</td>
<td>No</td>
</tr>
<tr>
<td>1189</td>
<td>3.018 Stairs</td>
<td>Fixtures &amp; Fittings - Whiteboard</td>
<td>No</td>
</tr>
<tr>
<td>1191</td>
<td>3.018 Stairs</td>
<td>Joinery - Bookshop</td>
<td>No</td>
</tr>
<tr>
<td>1196</td>
<td>3.018 Stairs</td>
<td>Misc - Fixtures</td>
<td>No</td>
</tr>
<tr>
<td>1188</td>
<td>3.018 Stairs</td>
<td>Misc - Misc</td>
<td>No</td>
</tr>
<tr>
<td>1183</td>
<td>3.018 Stairs</td>
<td>Misc - Misc, South</td>
<td>No</td>
</tr>
<tr>
<td>2238</td>
<td>3.018 Stairs</td>
<td>Partition Walls - Painting, East</td>
<td>No</td>
</tr>
<tr>
<td>1199</td>
<td>3.018 Study M</td>
<td>Ceiling Finishes - Painting</td>
<td>No</td>
</tr>
<tr>
<td>1184</td>
<td>3.018 Study M</td>
<td>Clean - Clean, East - Upper</td>
<td>No</td>
</tr>
<tr>
<td>1201</td>
<td>3.018 Study M</td>
<td>Door &amp; Frames - Sliding Door</td>
<td>No</td>
</tr>
<tr>
<td>1200</td>
<td>3.018 Study M</td>
<td>Door &amp; Frames - Sliding Door, Up</td>
<td>No</td>
</tr>
<tr>
<td>1207</td>
<td>3.018 Study M</td>
<td>Ceiling Finishes - Painting</td>
<td>No</td>
</tr>
</tbody>
</table>

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Signature:

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## DEFECTS INSPECTION

**By Location - Detailed (with Drawings)**

Filter: (Inspection = ) And Area Contains 'Level 03', Ignoring Case

### Building:  Area: Level 03  Location: South Zone

<table>
<thead>
<tr>
<th>Defect No</th>
<th>Room</th>
<th>Item, Subitem &amp; Orientation, Position</th>
<th>Passed</th>
<th>Comments (Defect)</th>
<th>Contractor</th>
<th>Completed</th>
<th>Inspection Company</th>
</tr>
</thead>
<tbody>
<tr>
<td>1213</td>
<td>3.021 30 Project</td>
<td>Ceiling Finishes - Painting</td>
<td>No</td>
<td>Touch Up Around Fittings Miss ceiling spots</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1214</td>
<td>3.021 30 Project</td>
<td>Ceiling Finishes - Painting, West - Upper</td>
<td>No</td>
<td>Touch Up Around Fittings Touch up between fixtures and blinds</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1216</td>
<td>3.021 30 Project</td>
<td>Ceiling Finishes - Routers</td>
<td>No</td>
<td>Miss clean plaster of cable tray</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1216</td>
<td>3.021 30 Project</td>
<td>Door &amp; Frames - Misc</td>
<td>No</td>
<td>All gpt cylinder missing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1208</td>
<td>3.021 30 Project</td>
<td>Door &amp; Frames - Paint to door</td>
<td>No</td>
<td>Remove paint overspray</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1208</td>
<td>3.021 30 Project</td>
<td>Fixtures &amp; Fittings - Light Switches</td>
<td>No</td>
<td>Complete not installed</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1208</td>
<td>3.021 30 Project</td>
<td>Floor Finishes - Carpet Tiles</td>
<td>No</td>
<td>Miss Carpet tile missing behind entrance door</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1208</td>
<td>3.021 30 Project</td>
<td>Floor Finishes - Carpet Tiles North - Lower</td>
<td>No</td>
<td>Requires Clean under whitewash</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1208</td>
<td>3.021 30 Project</td>
<td>Miss - Fittings, South</td>
<td>No</td>
<td>All cupboards fit-off</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1208</td>
<td>3.021 30 Project</td>
<td>Miss - Mise</td>
<td>No</td>
<td>Miss Remove excess pipe droppers from ceiling</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1208</td>
<td>3.021 30 Project</td>
<td>Partitions Walls - Painting</td>
<td>No</td>
<td>Paint JV cap internal</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1208</td>
<td>3.021 30 Project</td>
<td>Partitions Walls - Paint, North</td>
<td>No</td>
<td>Joints not Acceptable caulk between column and wall</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1208</td>
<td>3.021 30 Project</td>
<td>Partitions Walls - Paint, South</td>
<td>No</td>
<td>Joints not Acceptable caulk between column and wall</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1208</td>
<td>3.021 30 Project</td>
<td>Windows - Glass, South - Right</td>
<td>No</td>
<td>Glass missing Glue panel missing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2158</td>
<td>3.301 Lift Lobby</td>
<td>Ceiling Finishes - Feature Panels</td>
<td>No</td>
<td>Requires Clean Remove recess from ceiling</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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Signature: _

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## Appendix C: Sample Builder's Defect Inspection List (Level 3)

### DEFECTS INSPECTION

**By Location – Detailed (with Drawings)**  
*Filler: inspcompid — And Area Contains "Level 03", Ignoring Case*

<table>
<thead>
<tr>
<th>Building:</th>
<th>Area: Level 03</th>
<th>Location: South Zone</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Defect No</strong></td>
<td><strong>Room</strong></td>
<td><strong>Item, Subitem &amp; Orientation, Position</strong></td>
</tr>
<tr>
<td>401</td>
<td>3.201 Hotel Lobby</td>
<td>Mise - Fittings</td>
</tr>
<tr>
<td>1415</td>
<td>3.201 Hotel Lobby</td>
<td>Mise - Fittings</td>
</tr>
<tr>
<td>613</td>
<td>3.201 Hotel Lobby</td>
<td>Mise - Misc</td>
</tr>
<tr>
<td>2156</td>
<td>3.201 Hotel Lobby</td>
<td>Mise - Misc</td>
</tr>
<tr>
<td>1413</td>
<td>3.201 Hotel Lobby</td>
<td>Partition Walls - Painting</td>
</tr>
<tr>
<td>2159</td>
<td>3.201 Hotel Lobby</td>
<td>Partition Walls - Painting</td>
</tr>
<tr>
<td>1390</td>
<td>3.213 foyer</td>
<td>Door &amp; Frames - Paint-to-door</td>
</tr>
<tr>
<td>1297</td>
<td>3.213 foyer</td>
<td>Door &amp; Frames - Sliding Door North</td>
</tr>
<tr>
<td>1295</td>
<td>3.213 foyer</td>
<td>Door &amp; Frames - Sliding Door</td>
</tr>
<tr>
<td>2604</td>
<td>3.213 foyer</td>
<td>Floor Finishes - Polished Concrete Stained</td>
</tr>
<tr>
<td>1616</td>
<td>3.213 foyer</td>
<td>Jracey - Misc</td>
</tr>
<tr>
<td>2695</td>
<td>3.213 foyer</td>
<td>Partition Walls - Misc</td>
</tr>
</tbody>
</table>

**Date: / /**  
**Signature:**

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Information Management and Sharing Practices within a Construction Project Process  
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305
## DEFECTS INSPECTION

### By Location - Detailed (with Drawings)
Filter: {dep:compil = } And Area Contains 'Level 03', Ignoring Case

### Building: Area: Level 03 Location: South Zone

<table>
<thead>
<tr>
<th>Defect No</th>
<th>Floor</th>
<th>Item, Subitem &amp; Orientation, Position</th>
<th>Passed</th>
<th>Comments (Defect)</th>
</tr>
</thead>
</table>
| 26/6/20   | 3.213 Foyer | Partition Walls - Painting | No | Finish: Unknown
Knowledge: with wall vinyl |
| 19/6/20   | 3.213 Foyer | Partition Walls - Painting | No | Paint: Peeling
Wall:coat |
| 26/6/20   | 3.213 Foyer | Partition Walls - Post: West - Lower | No | Requires: Painting
Goods: at reception frame |
| 26/6/20   | 3.213 Foyer | Windows - Fixed Panel Frame | No | Finish: not Acceptable
Remove: overlay Glass to all frames |
| 15/6/20   | 3.402 Male WC | Tenanted - Side Lights | No | Misc: Recessed lights not working and diffusers missing |
| 15/6/20   | 3.402 Male WC | Tiles - Floor Tiles | No | Misc: Clean: mirror floor - especially at corners |
| 15/6/20   | 3.402 Male WC | Tiles - Wall Tiles | No | Misc: Grout missing |
| 15/6/20   | 3.402 Male WC | Tiles - Wall Tiles | No | Misc: Clean: excess
Grout: turn tiles |
| 27/6/20   | 3.456 Disabled WC | Vanity - Sink | No | Misc: Disabled bathroom shelf missing |

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### DEFECTS INSPECTION

By Location - Detailed (with Drawings)
Filter: (Inspection = ) And Area Contains "level 03", Ignoring Case

#### Buildings

<table>
<thead>
<tr>
<th>Lot No.</th>
<th>Area</th>
<th>Unit</th>
<th>Inspection</th>
<th>Passed</th>
<th>Comments (Defect)</th>
<th>Contractor</th>
<th>Completed</th>
<th>Inspection Company</th>
</tr>
</thead>
<tbody>
<tr>
<td>1046</td>
<td>3.001 30 Project</td>
<td>Delling Services - Fire Sprinkler</td>
<td>No</td>
<td>Blackout sprinkler pipe clips</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1059</td>
<td>3.001 30 Project</td>
<td>Delling Services - Light</td>
<td>No</td>
<td>Exteral (s) hanging down</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1055</td>
<td>3.001 30 Project</td>
<td>Dornicd Column - Paint</td>
<td>No</td>
<td>Requires Cleaning</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1056</td>
<td>3.001 30 Project</td>
<td>Dursin Walling - Timber Panels</td>
<td>No</td>
<td>Missing</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1058</td>
<td>3.001 30 Project</td>
<td>Door &amp; Frames - Misc</td>
<td>No</td>
<td>Air/ceiling cylinder missing</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1054</td>
<td>3.001 30 Project</td>
<td>Door &amp; Frames - Paint to door frame</td>
<td>No</td>
<td>Remove paint overspray</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1057</td>
<td>3.001 30 Project</td>
<td>Door &amp; Frames - Paint to door frame</td>
<td>No</td>
<td>Remove paint overspray</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1047</td>
<td>3.001 30 Project</td>
<td>Furtures &amp; Fillings - Whiteboard</td>
<td>No</td>
<td>Missing</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1048</td>
<td>3.001 30 Project</td>
<td>Floor Finishes - Carpet Tiles North - Lower</td>
<td>No</td>
<td>Also remove excess carpet near column</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1049</td>
<td>3.001 30 Project</td>
<td>Floor Finishes - Carpet Tiles North - Lower</td>
<td>No</td>
<td>Also remove excess carpet near column</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1052</td>
<td>3.001 30 Project</td>
<td>Miss - Misc</td>
<td>No</td>
<td>Installation fire: facade &amp; slab</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1053</td>
<td>3.001 30 Project</td>
<td>Partition Walls - Painting</td>
<td>No</td>
<td>Paint PV cellulier</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1059</td>
<td>3.001 30 Project</td>
<td>Partition Walls - Plaster</td>
<td>No</td>
<td>Joints not acceptable, cracking required fire column &amp; wall</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1051</td>
<td>3.001 30 Project</td>
<td>Windows - Fixed Panel Frame</td>
<td>No</td>
<td>Chipped/missing door</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1307</td>
<td>3.002 17 Store</td>
<td>Ceiling Finishes - Painting</td>
<td>No</td>
<td>Requires an Additional Coat</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1062</td>
<td>3.003 30 Workplace</td>
<td>Ceiling Finishes - Acoustic Panels - Upper</td>
<td>No</td>
<td>Misc</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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Signature:

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### DEFECTS INSPECTION

**By Location – Detailed (with Drawings)**

Filter: `inspcompid = ` And Area Contains 'level 03', Ignoring Case

**Building** | **Area Level 03** | **Location: West Zone** | **Contractor** | **Completed** | **Inspection Company**
---|---|---|---|---|---
1003 | 3.003 30 Wallplace Embedded | Ceiling Finish - Pating, South | No | Touch up around fittings | Pseolite light fitting |
785 | 3.003 30 Wallplace Embedded | Ceiling Finish - Painting, West - Upper | No | Touch up ceiling paint/whitewash | Fingerprints on 8 x 8 trim back |
1001 | 3.003 30 Wallplace Embedded | Cleaning Finish - Plaster | No | Remove plaster | Fire-resistant knee of carpet backseat | junction |
1022 | 3.003 30 Wallplace Embedded | Ceiling Services - Fire Sprinkler | No | Block out appliance pipe clip | |
1004 | 3.003 30 Wallplace Embedded | Clean - Close | No | Misc | Clean whiteboard |
1072 | 3.003 30 Wallplace Embedded | Concrete Column - Paint | No | Requires Cleaning | |
1071 | 3.003 30 Wallplace Embedded | Door & Frames - Misc | No | AV spot cylinder missing | |
1069 | 3.003 30 Wallplace Embedded | Door & Frames - Sliding Door | No | Colour Finish | Paint touch up to frame |
1063 | 3.003 30 Wallplace Embedded | Fixtures & Fittings - Light Switches | No | Complete list installed | |
1064 | 3.003 30 Wallplace Embedded | Fixtures & Fittings - Projector | No | | Paint pale black |
1074 | 3.003 30 Wallplace Embedded | Partition Walls - Misc, South | No | Clean paint from wall carpet | |
1762 | 3.003 30 Wallplace Embedded | Partition Walls - Painting | No | No projector screen paint | |
2233 | 3.003 30 Wallplace Embedded | Partition Walls - Painting | No | Paint HP ceiling | |

**Date: ** / 10

**Signature:**

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*Information Management and Sharing Practices within a Construction Project Process*

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## Appendix C: Sample Builder’s Defect Inspection List (Level 3)

### DEFECTS INSPECTION

**By Location - Detailed (with Drawings)**

Filter: (inspcmpld = ) And Area Contains: Level 03, Ignoring Case

**Building:**

<table>
<thead>
<tr>
<th>Defect No</th>
<th>Room</th>
<th>Item, Subitem &amp; Orientation, Position</th>
<th>Passed</th>
<th>Comments (Defect)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1070</td>
<td>3003 30 Workplce Embedded</td>
<td>Partition Walls - Painting, North - Lower</td>
<td>No</td>
<td>Requires Cleaning</td>
</tr>
<tr>
<td>1088</td>
<td>3003 30 Workplce Embedded</td>
<td>Partition Walls - Plaster, North - Lower</td>
<td>No</td>
<td>Finish not Even</td>
</tr>
<tr>
<td>1097</td>
<td>3003 30 Workplce Embedded</td>
<td>Partition Walls - Skirting</td>
<td>No</td>
<td>Misc</td>
</tr>
<tr>
<td>1066</td>
<td>3003 30 Workplce Embedded</td>
<td>Windows - Fixed Panel Frame, East - Lower</td>
<td>No</td>
<td>Rectify panel at interface, clean up partition &amp; unknown</td>
</tr>
<tr>
<td>1080</td>
<td>3004 30 Workplce Embedded</td>
<td>Ceiling Finish - Painting</td>
<td>No</td>
<td>Ductwork &amp; paint touch up</td>
</tr>
<tr>
<td>1091</td>
<td>3004 30 Workplce Embedded</td>
<td>Ceiling Finish - Plaster, Lip</td>
<td>No</td>
<td>Requires Patching, Around light fitting</td>
</tr>
<tr>
<td>1083</td>
<td>3004 30 Workplce Embedded</td>
<td>Ceiling Smokets - Fire Sprinkler</td>
<td>No</td>
<td>Block out sprinkler pipe clip</td>
</tr>
<tr>
<td>1088</td>
<td>3004 30 Workplce Embedded</td>
<td>Clean - Clean</td>
<td>No</td>
<td>Clean move tray</td>
</tr>
<tr>
<td>1090</td>
<td>3004 30 Workplce Embedded</td>
<td>Clean - Clean - Lower</td>
<td>No</td>
<td>Clean except, Walls in floor</td>
</tr>
<tr>
<td>1086</td>
<td>3004 30 Workplce Embedded</td>
<td>Concrete Column - Paint - Lower</td>
<td>No</td>
<td>Requires Cleaning</td>
</tr>
<tr>
<td>1079</td>
<td>3004 30 Workplce Embedded</td>
<td>Door &amp; Frames - Misc</td>
<td>No</td>
<td>AV cupboard cylinder missing</td>
</tr>
<tr>
<td>1081</td>
<td>3004 30 Workplce Embedded</td>
<td>Door &amp; Frames - Point to door</td>
<td>No</td>
<td>Clean glove overspray</td>
</tr>
<tr>
<td>1077</td>
<td>3004 30 Workplce Embedded</td>
<td>Fixtures &amp; Fittings - AV Panel</td>
<td>No</td>
<td>AV equipment missing</td>
</tr>
</tbody>
</table>

**Location: West Zone**

<table>
<thead>
<tr>
<th>Contract</th>
<th>Completed</th>
<th>Inspection Company</th>
</tr>
</thead>
</table>

**Date:____/____/20____**

**Signature:**

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### DEFECTS INSPECTION

**By Location - Detailed (with Drawings)**

**Filter:** (inspcorpid = ) And Area Contains "level 03", ignoring Case

**Building:**

<table>
<thead>
<tr>
<th>Date/No</th>
<th>Room</th>
<th>Item, Subitem &amp; Condition, Position</th>
<th>Passed</th>
<th>Comments (Select)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1081</td>
<td>3.004.30 Workplace Embled</td>
<td>Foulers &amp; Fittings - Light Switches</td>
<td>No</td>
<td>Complete Not Installed</td>
</tr>
<tr>
<td>1075</td>
<td>3.004.30 Workplace Embled</td>
<td>Floor Finishes - Carpet Tiles north</td>
<td>No</td>
<td>Multi good joints, Gap live carpet &amp; skirting</td>
</tr>
<tr>
<td>1085</td>
<td>3.004.30 Workplace Embled</td>
<td>Floor Finishes - Misc</td>
<td>No</td>
<td>Misc hole in slab floor</td>
</tr>
<tr>
<td>1084</td>
<td>3.004.30 Workplace Embled</td>
<td>Misc - Fillings</td>
<td>No</td>
<td>Blinds missing</td>
</tr>
<tr>
<td>2751</td>
<td>3.004.30 Workplace Embled</td>
<td>Misc - Paint</td>
<td>No</td>
<td>Requires an Additional Cost, Paint touch up to wall and ceiling patch work</td>
</tr>
<tr>
<td>2732</td>
<td>3.004.30 Workplace Embled</td>
<td>Partition Walls - Painting</td>
<td>No</td>
<td>Paint All spot interior</td>
</tr>
<tr>
<td>1089</td>
<td>3.004.30 Workplace Embled</td>
<td>Partition Walls - Plaster - North - Lower</td>
<td>No</td>
<td>Requires Sanding</td>
</tr>
<tr>
<td>1087</td>
<td>3.004.30 Workplace Embled</td>
<td>Partition Walls - Skirting, South - Lower</td>
<td>No</td>
<td>Gaps in Wall Complete underst end wall near teacher desk</td>
</tr>
<tr>
<td>1111</td>
<td>3.005.30 Project</td>
<td>Ceiling Finishes - Misc, South - Upper</td>
<td>No</td>
<td>Misc Fill holes in sofit</td>
</tr>
<tr>
<td>1113</td>
<td>3.005.30 Project</td>
<td>Ceiling Finishes - Painting, East - Upper</td>
<td>No</td>
<td>Beam touch up</td>
</tr>
<tr>
<td>1107</td>
<td>3.005.30 Project</td>
<td>Ceiling Finishes - Painting, Up</td>
<td>No</td>
<td>Touch Up Around Fittings, Ductwork Paint touch up</td>
</tr>
<tr>
<td>1113</td>
<td>3.005.30 Project</td>
<td>Ceiling Finishes - Painting, Lower</td>
<td>No</td>
<td>Touch Up Around Fittings, Grille &amp; sensor at entrance</td>
</tr>
<tr>
<td>1104</td>
<td>3.005.30 Project</td>
<td>Ceiling Finishes - Plaster</td>
<td>No</td>
<td>Remove planter from cable key</td>
</tr>
</tbody>
</table>

Date: __/__/20

Signature: ______________________________

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Information Management and Sharing Practices within a Construction Project Process

Huan Cong Vo-Tran
### Appendix C: Sample Builder’s Defect Inspection List (Level 3)

#### DEFECTS INSPECTION

**By Location - Detailed (with Drawings)**

Filter: (inspected) = ‘Yes’ and Area Contains “level 03”, Ignoring Case

<table>
<thead>
<tr>
<th>Building</th>
<th>Area: Level 03</th>
<th>Comments (Defect)</th>
<th>Contractor</th>
<th>Completed</th>
<th>Inspection Company</th>
</tr>
</thead>
<tbody>
<tr>
<td>1112</td>
<td>3.005-30 Project</td>
<td>Ceiling Finishes - Plaster</td>
<td>No</td>
<td>Requires Polishing, putty immoral around bilirubin, grilles, acoustic panel</td>
<td></td>
</tr>
<tr>
<td>1115</td>
<td>3.005-30 Project</td>
<td>Ceiling Finishes - Plastic, South - Upper</td>
<td>No</td>
<td>Requires Screwing, Access panel door frame</td>
<td></td>
</tr>
<tr>
<td>836</td>
<td>3.005-30 Project</td>
<td>Clean - Clean</td>
<td>No</td>
<td>Clean bag hook, carpet</td>
<td></td>
</tr>
<tr>
<td>1097</td>
<td>3.005-30 Project</td>
<td>Clean - Clean, South - Upper</td>
<td>No</td>
<td>Clean carpet bulkhead, remove paint</td>
<td></td>
</tr>
<tr>
<td>1105</td>
<td>3.005-30 Project</td>
<td>Clean - Clean, Up</td>
<td>No</td>
<td>Clean carpet bulkhead, remove paint</td>
<td></td>
</tr>
<tr>
<td>1098</td>
<td>3.005-30 Project</td>
<td>Clean - Clean</td>
<td>No</td>
<td>Clean upstand wall, water marking</td>
<td></td>
</tr>
<tr>
<td>1933</td>
<td>3.005-30 Project</td>
<td>Curtain Walling - Timber Panels</td>
<td>No</td>
<td>Missing, fill back access panel</td>
<td></td>
</tr>
<tr>
<td>1101</td>
<td>3.005-30 Project</td>
<td>Curtain Walling - Timber Panels, West</td>
<td>No</td>
<td>Missing</td>
<td></td>
</tr>
<tr>
<td>1109</td>
<td>3.005-30 Project</td>
<td>Fixtures &amp; Fittings - AV Panel</td>
<td>No</td>
<td>AV equipment missing</td>
<td></td>
</tr>
<tr>
<td>1100</td>
<td>3.005-30 Project</td>
<td>Fixtures &amp; Fittings - Clean</td>
<td>No</td>
<td>Clean bag hook, carpet, Remove glue</td>
<td></td>
</tr>
<tr>
<td>1108</td>
<td>3.005-30 Project</td>
<td>Fixtures &amp; Fittings - Light Switches, North</td>
<td>No</td>
<td>Coverplate not installed</td>
<td></td>
</tr>
<tr>
<td>1114</td>
<td>3.005-30 Project</td>
<td>Floor Finishes - Carpet Tiles, East - Lower</td>
<td>No</td>
<td>Missing, good prints, Gap between carpet &amp; skirting</td>
<td></td>
</tr>
<tr>
<td>1103</td>
<td>3.005-30 Project</td>
<td>Misc - Fillings</td>
<td>No</td>
<td>Fillings missing</td>
<td></td>
</tr>
<tr>
<td>1024</td>
<td>3.005-30 Project</td>
<td>Misc - Misc</td>
<td>No</td>
<td>Insulation by outside &amp; slab, Fix</td>
<td></td>
</tr>
<tr>
<td>2752</td>
<td>3.005-30 Project</td>
<td>Misc - Paint</td>
<td>No</td>
<td>Requires an Additional Cost, Paint touch up to ceiling, patch work</td>
<td></td>
</tr>
</tbody>
</table>

**Date: / /20**

**Signature:**

---

Information Management and Sharing Practices within a Construction Project Process

Huan Cong Vo-Tran
### Appendix C: Sample Builder’s Defect Inspection List (Level 3)

#### DEFECTS INSPECTION

**By Location: Detailed (with Drawings)**

Filter: (inscompcl = ) And Area Contains "Level 03", Ignoring Case

**Building: Area: Level 03** Location: West Zone

<table>
<thead>
<tr>
<th>Defect No</th>
<th>Room</th>
<th>Description</th>
<th>Condition</th>
<th>Comments (Defect)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2231</td>
<td>0.005 30 Project</td>
<td>Partition Walls - Painting</td>
<td>No</td>
<td>Poor finish on paint - need repairs</td>
</tr>
<tr>
<td>1999</td>
<td>0.006 30 Project</td>
<td>Partition Walls - Painting</td>
<td>No</td>
<td>Requires cleaning - clean marks on wall, plaster &amp;满分 marks</td>
</tr>
<tr>
<td>1992</td>
<td>0.006 30 Project</td>
<td>Partition Walls - Plaster/North</td>
<td>No</td>
<td>Joints not Acceptable - caulking and painting required at junction between column and wall</td>
</tr>
<tr>
<td>1995</td>
<td>0.006 30 Project</td>
<td>Partition Walls - Plaster</td>
<td>No</td>
<td>Joints not Acceptable - caulking between facade and wall</td>
</tr>
<tr>
<td>1421</td>
<td>0.006 30 Project</td>
<td>Partition Walls - Plaster/Loans</td>
<td>No</td>
<td>Joints not Acceptable - caulking between upper wall and facade</td>
</tr>
<tr>
<td>1105</td>
<td>0.006 30 Project</td>
<td>Partition Walls - Skirting</td>
<td>No</td>
<td>HAS come away from wall</td>
</tr>
<tr>
<td>1102</td>
<td>0.006 30 Project</td>
<td>Windows - Large Panel Frame, South - Lower</td>
<td>No</td>
<td>Damaged - replace glass</td>
</tr>
<tr>
<td>1120</td>
<td>0.006 30 Project</td>
<td>Ceiling features - Acoustic Panels/Up</td>
<td>No</td>
<td>Nicc - panels missing</td>
</tr>
<tr>
<td>1117</td>
<td>0.006 30 Project</td>
<td>Ceiling features - Misc</td>
<td>No</td>
<td>clean plaster off cable tray</td>
</tr>
<tr>
<td>812</td>
<td>0.006 30 Project</td>
<td>Ceiling features - Painting</td>
<td>No</td>
<td>Touch-up ceiling paintwork - Touch-up beams</td>
</tr>
<tr>
<td>1119</td>
<td>0.006 30 Project</td>
<td>Concrete Column - Paint</td>
<td>No</td>
<td>Finish uneven - point back of column</td>
</tr>
<tr>
<td>16/16</td>
<td>0.006 30 Project</td>
<td>Fixtures &amp; Fitments - Projector</td>
<td>No</td>
<td>Paint pole black - exposed concrete areas</td>
</tr>
<tr>
<td>1121</td>
<td>0.006 30 Project</td>
<td>Floor Finishes - Carpet, Tiles, West</td>
<td>No</td>
<td>Make good joints - joint b/w stairs &amp; carpet under whickboard</td>
</tr>
<tr>
<td>1422</td>
<td>0.006 30 Project</td>
<td>Misc - Paint</td>
<td>No</td>
<td>Finish uneven - paint on inside of head junction</td>
</tr>
</tbody>
</table>

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Huan Cong Vo-Tran
### Appendix C: Sample Builder’s Defect Inspection List (Level 3)

**DEFECTS INSPECTION**

**By Location - Detailed (with Drawings)**

**Filter:** (Inspec comprise = ) And Area Contains "Level 03", Ignoring Case

<table>
<thead>
<tr>
<th>Defects No.</th>
<th>Room</th>
<th>Item, Subitem &amp; Orientation, Position</th>
<th>Passed</th>
<th>Comments (Defect)</th>
<th>Contractor</th>
<th>Complaint</th>
<th>Inspection Company</th>
</tr>
</thead>
<tbody>
<tr>
<td>816</td>
<td>3.006 3D Project</td>
<td>Misc - Paint</td>
<td>No</td>
<td>Requires Cleaning paint on trim, scared and door</td>
<td>Higgins Ceilings</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1122</td>
<td>3.006 3D Project</td>
<td>Partition Walls - Painting</td>
<td>No</td>
<td>Paint AV qty internal</td>
<td>Higgins Ceilings</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1118</td>
<td>3.006 3D Project</td>
<td>Partition Walls - Painting, South - Left</td>
<td>No</td>
<td>Requires an Additional Cost</td>
<td>Higgins Ceilings</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1116</td>
<td>3.006 3D Project</td>
<td>Windows - Rund Panel Form</td>
<td>No</td>
<td>Finish not Acceptable Add paint req</td>
<td>Higgins Ceilings</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2074</td>
<td>3.007 3D Staff Point</td>
<td>Ceiling Finishes - Painting</td>
<td>No</td>
<td>Requires an Additional Cost</td>
<td>Higgins Ceilings</td>
<td></td>
<td></td>
</tr>
<tr>
<td>820</td>
<td>3.007 3D Staff Point</td>
<td>Clean - Clean</td>
<td>No</td>
<td>General clean required</td>
<td>Clean City</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2072</td>
<td>3.007 3D Staff Point</td>
<td>Door &amp; Frames - Door</td>
<td>No</td>
<td>Finish not Acceptable Final paint to door frames</td>
<td>Higgins Ceilings</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2071</td>
<td>3.007 3D Staff Point</td>
<td>Partition Walls - Painting</td>
<td>No</td>
<td>Requires Cleaning Remove paint over spray</td>
<td>Higgins Ceilings</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2073</td>
<td>3.007 3D Staff Point</td>
<td>Partition Walls - Painting</td>
<td>No</td>
<td>Requires an Additional Cost</td>
<td>Higgins Ceilings</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2075</td>
<td>3.007 3D Staff Point</td>
<td>Partition Walls - Trim, South - Lower</td>
<td>No</td>
<td>Requires Painting Near GPO</td>
<td>Expocell Pty Ltd</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2078</td>
<td>3.008 3D Service Point</td>
<td>Door &amp; Frames - Door</td>
<td>No</td>
<td>Hail paint</td>
<td>Higgins Ceilings</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2076</td>
<td>3.008 3D Service Point</td>
<td>Door &amp; Frames - Door, West</td>
<td>No</td>
<td>Misc caulk bw, cdp doors</td>
<td>Brookfield Multiplex Pty Ltd</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1361</td>
<td>3.008 3D Service Point</td>
<td>Door &amp; Frames - Paint to door frame</td>
<td>No</td>
<td>Misc Mdfen mill to frame edge paint</td>
<td>Higgins Ceilings</td>
<td></td>
<td></td>
</tr>
<tr>
<td>303</td>
<td>3.008 3D Service Point</td>
<td>Misc - Paint</td>
<td>No</td>
<td>Incomplete</td>
<td>Higgins Ceilings</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2077</td>
<td>3.008 3D Service Point</td>
<td>Partition Walls - Siding</td>
<td>No</td>
<td>Complete Wall complete skiting behind joinery</td>
<td>Higgins Ceilings</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2080</td>
<td>2.214 3D Staff Point</td>
<td>Ceiling Finishes - Painting</td>
<td>No</td>
<td>Incomplete Final fold of portal ceiling to be blank as per mockup</td>
<td>Higgins Ceilings</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Date:** / / 20

**Signature:**

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Information Management and Sharing Practices within a Construction Project Process

Huan Cong Vo-Tran
## DEFECTS INSPECTION

**By Location - Detailed (with Drawings)**

Filter: (inspcompid = ) And Area Contains 'level 03', Ignoring Case

<table>
<thead>
<tr>
<th>Building Area Level 03</th>
<th>Location: West Zone</th>
<th>Contractor</th>
<th>Completed</th>
<th>Inspection Company</th>
</tr>
</thead>
<tbody>
<tr>
<td>1366</td>
<td>2.214 Foyer Ceiling Finishes - Painting</td>
<td>No</td>
<td>Touch-up ceiling primer &amp; Tei laite putty and plaster ceilings</td>
<td></td>
</tr>
<tr>
<td>1369</td>
<td>2.214 Foyer Ceiling Finishes - Fire Sprinkler</td>
<td>No</td>
<td>Sprinkler flange to be back</td>
<td></td>
</tr>
<tr>
<td>2091</td>
<td>2.214 Foyer Door &amp; Frames - Misc</td>
<td>No</td>
<td>Final paint all areas - doors, Internal and external</td>
<td></td>
</tr>
<tr>
<td>1395</td>
<td>2.214 Foyer Fixtures &amp; Finishes - AV Panel</td>
<td>No</td>
<td>Missing AV equipment, missing -</td>
<td></td>
</tr>
<tr>
<td>1249</td>
<td>2.214 Foyer Misc - Misc</td>
<td>No</td>
<td>Clean plaster from cable tray</td>
<td></td>
</tr>
<tr>
<td>1252</td>
<td>2.214 Foyer Misc - Misc</td>
<td>No</td>
<td>Clean render from pipework</td>
<td></td>
</tr>
<tr>
<td>1253</td>
<td>2.214 Foyer Misc - Misc</td>
<td>No</td>
<td>Paint ductwork</td>
<td></td>
</tr>
<tr>
<td>1279</td>
<td>2.214 Foyer Misc - Misc</td>
<td>No</td>
<td>Wall from carpet to milled to fully painted wall and a skirting</td>
<td></td>
</tr>
<tr>
<td>1254</td>
<td>2.214 Foyer Partition Walls - Misc</td>
<td>No</td>
<td>Clean carpet, build head</td>
<td></td>
</tr>
<tr>
<td>2084</td>
<td>2.214 Foyer Partition Walls - Painting</td>
<td>No</td>
<td>Black paint missing around service, case as per Lyons mark up</td>
<td></td>
</tr>
<tr>
<td>1367</td>
<td>2.214 Foyer Partition Walls - Painting</td>
<td>No</td>
<td>Paint patchy, next paint</td>
<td></td>
</tr>
<tr>
<td>2083</td>
<td>2.214 Foyer Windows - Fixed Panel Frame, West - Upper</td>
<td>No</td>
<td>Damaged, 2 isbn on 3D project room</td>
<td></td>
</tr>
<tr>
<td>2133</td>
<td>2.215 Foyer Ceiling Finishes - Painting</td>
<td>No</td>
<td>Incomplete</td>
<td></td>
</tr>
<tr>
<td>1392</td>
<td>2.215 Foyer Ceiling Finishes - Painting</td>
<td>No</td>
<td>Touch-up ceiling primers &amp; tei laite putty without building</td>
<td></td>
</tr>
<tr>
<td>2139</td>
<td>2.215 Foyer Door &amp; Frames - Door Jambs</td>
<td>No</td>
<td>Crack gaps at interface</td>
<td></td>
</tr>
</tbody>
</table>

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Signature: 

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## Appendix C: Sample Builder’s Defect Inspection List (Level 3)

### DEFECTS INSPECTION

**By Location - Detailed (with Drawings)**

Filter: (disilesscon = ) And Area Contains 'Level 03', Ignoring Case

<table>
<thead>
<tr>
<th>Defect No</th>
<th>Room</th>
<th>Item, Subitem &amp; Description, Position</th>
<th>Passed</th>
<th>Comments (Defect)</th>
<th>Location: West Zone</th>
</tr>
</thead>
<tbody>
<tr>
<td>2123</td>
<td>3.215 Foyer</td>
<td>Door &amp; Frames - Misc</td>
<td>No</td>
<td>Final paint all service outlets</td>
<td></td>
</tr>
<tr>
<td>2134</td>
<td>3.215 Foyer</td>
<td>Floor Finishes - Polished Concrete Screed</td>
<td>No</td>
<td>Crack &amp; clean joints</td>
<td></td>
</tr>
<tr>
<td>2134</td>
<td>3.215 Foyer</td>
<td>Floor Finishes - Polished Concrete Slab</td>
<td>No</td>
<td>Misc. Remove conduit &amp; fill slab</td>
<td></td>
</tr>
<tr>
<td>2125</td>
<td>3.215 Foyer</td>
<td>Floor Finishes - Polished Concrete Slab</td>
<td>No</td>
<td>Misc. Remove conduit &amp; fill slab</td>
<td></td>
</tr>
<tr>
<td>2127</td>
<td>3.215 Foyer</td>
<td>Misc - Fixtures</td>
<td>No</td>
<td>Corner guards missing</td>
<td></td>
</tr>
<tr>
<td>2129</td>
<td>3.215 Foyer</td>
<td>Misc - Misc</td>
<td>No</td>
<td>Clean recessed from pipes</td>
<td></td>
</tr>
<tr>
<td>2121</td>
<td>3.215 Foyer</td>
<td>Misc - Misc</td>
<td>No</td>
<td>Tidy up wiring</td>
<td>At util. area near cpd</td>
</tr>
<tr>
<td>2129</td>
<td>3.215 Foyer</td>
<td>Partition Walls - Misc</td>
<td>No</td>
<td>Misc. Complete all vinyl &amp; internal corners</td>
<td></td>
</tr>
<tr>
<td>2130</td>
<td>3.215 Foyer</td>
<td>Partition Walls - Painting, Ext.</td>
<td>No</td>
<td>Finish Linen, complete black band to core walls (rendered)</td>
<td></td>
</tr>
<tr>
<td>2131</td>
<td>3.215 Foyer</td>
<td>Partition Walls - Painting</td>
<td>No</td>
<td>Finish Linen, service core black band missing</td>
<td></td>
</tr>
<tr>
<td>2137</td>
<td>3.215 Foyer</td>
<td>Partition Walls - Painting</td>
<td>No</td>
<td>Misc. caulk to plain &amp; plain junction</td>
<td></td>
</tr>
<tr>
<td>2135</td>
<td>3.215 Foyer</td>
<td>Partition Walls - Painting</td>
<td>No</td>
<td>Paint Parco</td>
<td>Paint above 1.5 above ceiling (black)</td>
</tr>
<tr>
<td>2138</td>
<td>3.215 Foyer</td>
<td>Partition Walls - Painting</td>
<td>No</td>
<td>Require Covering</td>
<td>Remove reference from fire alarm sign</td>
</tr>
<tr>
<td>2122</td>
<td>3.215 Foyer</td>
<td>Partition Walls - Painting</td>
<td>No</td>
<td>Requires an Additional Coat</td>
<td>Black paint to west and north bulkheads of laddered ceilings</td>
</tr>
</tbody>
</table>

Date:__/__/20

Signature:

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### Appendix D: Table of Key Findings

<table>
<thead>
<tr>
<th>Theme</th>
<th>Literature</th>
<th>Relationship to findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>The use of tacit knowledge in the construction industry</td>
<td>Knowledge that generated in the construction industry is often experienced-based and tacit in nature. It can often be found embedded in the minds of the professionals and operative workers. The potential for improving site management practices depends heavily on the right combination of knowledge and experiences (Mohamed &amp; Anumba 2006; Chen &amp; Mohamed 2010).</td>
<td>The findings from this study confirmed the research conducted by Mohamed and Anumba 2006 and Chen and Mohamed 2010 whereby experienced stakeholders such as Colin and Alan were seen to possess greater amounts of tacit knowledge and make use of it to assist them in the management and sharing of information. With respects to the right combination of knowledge and experience, it was observed the defects inspection team included a fine balance of knowledge and experience. The team consisted of two experienced stakeholders (Colin and Alan) who possessed a great deal of tacit knowledge and two less experienced stakeholders (George and Lisa) who tended to rely more upon the use of explicit forms of documentation.</td>
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<td>The human factor and their use of tacit knowledge plays a significant role as the construction industry can be seen as being labour and knowledge intensive (Pathirage et al. 2007).</td>
<td>In relation to Pathirage’s et al. (2007) work, the findings from this study also confirmed that the construction industry is knowledge intensive. This was demonstrated by the stakeholders (in particular Colin and Alan) on numerous occasions whereby they needed to make use of their tacit knowledge to assist them with the management and sharing of information.</td>
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### Theme

#### The use of explicit knowledge in the construction industry

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<td>Explicit knowledge can be used and reused to solve problems which display a similar nature or facilitates the connection of people with valuable, reusable knowledge (Zach 1999; Hansen 2000; Lee &amp; Yang 2000; Smith 2001; Harsh 2009).</td>
<td>The findings from this study validated the work of Zach (1999); Hansen (2000); Lee &amp; Yang (2000); Smith (2001); Harsh (2009). Through the use of explicit knowledge (the defects inspection lists) Lisa was able to connect the stakeholders involved in the defects inspection process. These lists were seen as valuable and contained reusable knowledge of a similar nature (i.e. the identification of which contractor was responsible for the rectification of paint works. In addition to solving problems of a similar nature, the findings suggested that explicit knowledge was used by the stakeholders to deal with the volume and complexity of the information presented before them, and to protect themselves from any possible liabilities they might face as a result of conducting the defects inspection process.</td>
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### Theme

#### The tacit knowledge acquired is difficult to reproduce and transfer into explicit knowledge and thus, made it a challenging task to share amongst others (Teerajetgul & Chareonngam 2008).

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<td>Regarding Teerajetgul and Chareonngam’s (2008) study, the findings showed that the tacit knowledge that the stakeholders possessed was difficult to reproduce as each stakeholder possessed varying levels according to their experiences. It was also a difficult task to transfer into explicit knowledge due to the environment they worked within (construction site) and share as it would only be externalised when a trigger event such as an event arising similar to what they previously experienced or through someone asking them a question presented itself.</td>
<td>In addition to what had been reported in the extant literature surrounding tacit knowledge and its use in the construction industry, the findings from this study also drew upon Nonaka’s (1994) SECI model of knowledge dimensions to develop a generalised model which demonstrated the stakeholders’ use of tacit knowledge to manage and share information.</td>
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<td>Explicit knowledge works well in organisations that operate on routineness and patterns, but where imagination and flexibility are important (such as an architectural or construction firms), knowledge routinisation may be deemed as being inappropriate or hindering the creativity process (Zach 1999).</td>
<td>Mohamed and Anumba (2006) and Terrajetgul and Chareonngam (2008) state that the construction industry, and in particular construction projects are unique and fast moving in nature. This, in turn, means that it is quite difficult for explicit knowledge to operate well as requires routineness and patterns as suggested by Zach (1999). However, the findings from this study suggests that this is not the case. Even though it was established that the defects inspection process was iterative and sometimes conducted in an ad-hoc in manor, the use of the explicit knowledge (especially the defects inspection lists) was able assist the stakeholders to successfully complete the inspections by adding structure and stability to this process.</td>
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Information Management and Sharing Practices within a Construction Project Process
Huan Cong Vo-Tran
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<td>The use of domain-specific knowledge in the construction industry</td>
<td>Domain-specific knowledge is an enabler for experts (individuals with a large amount of experience in a particular domain) to recognise domain-relevant patterns and automatically apply this to solve domain-related problems (Chi et al. 1982; Siegler &amp; Richards 1982).</td>
<td>Chi et al. (1982) and Siegler and Richards (1982) proposed that domain-specific knowledge is an enabler for experts to recognise domain-relevant patterns and automatically apply this to solve domain-related problems. Within the context of this study, it was exactly the case. The findings showed that stakeholders who possessed a greater amount of domain-specific knowledge (which is closely tied to experience) such as Colin and Alan were able to recognise domain-relevant patterns such as the “glossy paint” and “missing seals” stories discussed in Chapter 7.3.1 and 7.3.2 and automatically apply their domain-specific knowledge to resolve these issues.</td>
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<td>From a construction industry perspective, domain-specific knowledge plays a pivotal role in the successful completion of a construction project as it can be used in conjunction with experience (Zhi 1995; Josephson &amp; Hammarlund 1999).</td>
<td>With respects to the works by Zhi (1995) and Josephson &amp; Hammarlund (1999) domain-specific knowledge played a pivotal role in the successful completion of a construction project as it was used in conjunction with experience. ‘Within the context of this study, experienced stakeholders such as Colin and Alan were able to demonstrate their domain-specific knowledge to hasten and guide the defects inspection process to a successful completion (see Chapters 7.3.1, 7.7.3).</td>
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<td>In addition to what had been reported in the literature surrounding domain-specific knowledge and its use in the construction industry, the findings from this study also revealed that domain-specific knowledge as being one of the major contributing factors that aided in the process of a stakeholder being able to internalise information to create new tacit knowledge. The findings also indicated that the possession of domain-specific knowledge enabled stakeholders to comprehend both the complex and technical nature of documents often produced within the construction industry. Furthermore, stakeholders who possessed domain-specific knowledge from more than one domain could act as a conduit between the stakeholders from differing domains. They are able to take on multiple roles in order to facilitate a common dialogue between stakeholders from various domains which, in turn, leads to effective sharing of information.</td>
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<td>Experience, experience-guided working and the use of experience in construction</td>
<td>When experience applied in various work environments the use of human experience can be seen as a necessity as it facilitates flexibility and effectiveness in unpredictable and critical situations (Carus et al. 1992).</td>
<td>The findings from this study validated the work of Carus et al. (1992) whereby the authors stated that experience can be seen as a necessity when applied in various work environments (in this instance construction) as it facilitates flexibility and effectiveness in unpredictable and critical situations. Within the context of this study, the more experienced stakeholders (Colin and Alan) were able to make use of their experience to make judgements (flexibility) to effectively rule out items that were deemed to be defective by other less experienced stakeholders. Through this study there were many examples of this happening, one of which was described in Chapter 7.3.3 whereby Lisa identified some scuff marks on the desk in one of the classrooms. Instead of recording it as a defect, Alan quickly intervened by demonstrating the use of his experience and stated that it should not be recorded as a defect due to the fact that it would just get dirty again after the electricians came through and install the power and data umbilical cords.</td>
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<td>Individuals are able to make use of their prior experiences in order to guide their current work practices (Carus et al. 1992; Herbig et al. 2001; Büsing &amp; Herbig 2003).</td>
<td>Although the works by Carus et al. (1992), Herbig et al. (2001), and Büsing &amp; Herbig (2003) were conducted within the context of industrial production and nursing, they could be seen as being applicable within the construction industry. The findings from this study showed that experienced stakeholders involved in the defects inspection process were able to make use of their prior experiences to guide their current work practices. An example of this happening could be demonstrated by Colin’s ‘A systematic way of doing things’ story (see Chapter 7.3.1). It was here that Colin was able to draw upon his previous experiences in defecting buildings to devise a systematic way of conducting them.</td>
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<td>One of the most important factors that causes delays in construction projects can be attributed to inadequate contractor experience (Odeh &amp; Battaineh 2002; Assaf &amp; Al-Hejji 2006; Sambasivan &amp; Soon 2007).</td>
<td>Odeh and Battaineh (2002), Assaf and Al-Hejji (2006) and Sambasivan &amp; Soon (2007) suggested that one of the most important factors that causes delays in construction projects could be attributed to inadequate contractor experience. Within the context of this study, the architects could be seen as contractors as they were contracted back to the builders for the purposes of inspecting the building. The findings from this study indicated that this was not an issue as Colin was seen as a very experienced architect and George was often supported by the builders.</td>
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<td>In addition to what had been reported in the extant literature surrounding experience, experience-guided working and its use in the construction industry, the findings from this study also revealed that stakeholders were able to make use of their experience to alter the way they managed and shared information i.e. Alan and the use of his mobile phone (see Chapter 7.8).</td>
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<td>Personal Information</td>
<td>Users will tend to use what is convenient and generally accessible as opposed to seeking out other sources that may be more appropriate but not as easily obtainable (Marchionini 1997).</td>
<td>The findings from this study validated the work of Marchionini (1997) which suggested that users will tend to use what is convenient and generally assessable as opposed to other sources that may be more appropriate but not as easily obtainable. With respect to information management and sharing this was point was demonstrated by all four stakeholders investigated in this study. For example, Colin’s preference for his notebook over the defects inspection lists; Alan’s use of his mobile phone over the explicit forms of documentation; George’s use of notebook to record project-related information and Lisa’s use of her explicit forms of documentation over the use of the tablet.</td>
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<td>Work can be seen as highly situational, context-based and constrained. This, in turn, influences the way that information is handled and managed (Barreau 1995; Jones et al. 2002; Gwizdka &amp; Chignell 2007).</td>
<td>The studies conducted by Barreau (1995), Jones et al. (2002), and Gwizdka &amp; Chignell (2007) in relation to work being seen as highly situational, context-based and constrained, which, in turn, influenced the way that information is handled and managed was also of relevance to this study. The findings showed that the stakeholders’ information management and sharing practices was influenced by their role (situation), the defects inspection process (context) and time (constraints).</td>
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<td>Personal information management is usually a private task whereby individuals create personalised information with sharing in mind. However, the sharing of this personalised information can lead to many problems, especially if it involves work practices (Erikson 2006).</td>
<td>Erikson (2006) argued that the sharing of personalised information leading to many problems especially if it involves work practices. The findings from this study found no such problem as the personalised information created by the stakeholders was not shared amongst the rest of the team (but it was stored on the ACONEX system). Information that was shared explicitly was more than often found in a template that was created by the organisations involved in the defects inspection process.</td>
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<td>Developments and advancements made with the technologies and tools supporting personal information management activities invariably they create new problems and further exacerbate existing ones too (Jones 2007).</td>
<td>Jones (2007) suggested that developments and advancements made with the technologies and tools supporting personal information management activities invariably create new problems and further exacerbate existing ones too. However, the findings from this study contradicted Jones’ (2007) work. The findings from this study suggested that the tools and technologies that supported the stakeholders (Alan with his mobile phone and George with his camera) in their personal information management could be seen as reducing the amount of potential problems.</td>
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### Theme: Enterprise Information Management

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<td>Individuals who possess similar profiles (job and demographics) can exhibit huge differences in their behaviour (management and presentation) and that these differences can be applied both in respect to the management of paper-based documents and electronic resources (Gwizdka &amp; Chignell 2007).</td>
<td>The findings form this study validated the work of Gwizdka &amp; Chignell (2007). It showed that stakeholders who possessed similar profiles (job and demographics) exhibited huge differences in their information management behaviour and that these differences can be applied with respect to both the management of paper-based and electronic resources. Within the context of this study, Colin and George were seen as stakeholders who possessed similar profiles. However, upon closer examination of their personal information management practices, it was revealed that they ultimately had very different systems to code, record and store project-related information.</td>
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<td>The concept of Enterprise Information Management allows an organisation to take their information one step further by approaching it from an enterprise-wide perspective (van der Lans &amp; van Til 2013).</td>
<td>The findings from this study have been able to provide a case-study example that was suggested as being lacking by Logan and Bill (2009) and van der Lans and van Til (2013). It acknowledges that the concept of enterprise information management is still in its infancy stage, however this case-study does raise some further issues, for example the use of enterprise information management practices across two or more organisation working on the same project.</td>
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<td>Enterprise information management is still in its infancy as there is currently a lack in the required case studies, maturity models and frameworks to demonstrate the power of the concept (Logan &amp; Bill 2009; van der Lans &amp; van Til 2013).</td>
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