

Understanding design thinking in practice:

A qualitative study of design led professionals
working with large organisations

Zaana Howard

Doctor of Philosophy

2015

Abstract

Design thinking is a collaborative and human centred approach to solving problems. Over the past decade design thinking has evolved considerably, particularly with regard to innovation within the sectors of design and business. Despite this sharp rise to popularity there remains limited understanding of how design thinking is applied in practice and little empirical investigation into this subject. Without this understanding further informed application and development of the approach will be hampered.

The 'design led professional' is an individual who uses design approaches in their work practices whose education and experience however may not necessarily be in design. The central aim of this thesis is to understand how the 'design led professional' applies design thinking in practice with large organisations where the focus is on designing intangible products such as systems, services and experiences. The thesis addresses the research problem through the exploration of the question: *How does the design led professional understand and enact design thinking in practice?* This question is explored within the context of the design led professional working with large organisations.

A qualitative research approach was adopted, which involved ethnographic methods of semi structured interviews, artefact analysis and participant observation. Data was collected across three studies: an expert interview study, a retrospective case study and a participatory case study. The constant comparative grounded theory method was used to analyse and synthesise data.

Research findings, contextualised within relevant literature, reveal the composition of design thinking in practice: as constrained by the approach taken in applying design thinking; the maturity of the design led professional and the environment in which design thinking is conducted.

On this basis two models are proposed in the conclusion as a foundation for further

application and development. The first presents a scale of design thinking maturity based upon two perspectives of design thinking as a way of work and a way of life. The second model maps the interdependent relationship between the three components of design thinking in practice of the approach, the design led professional and the environment in which it is conducted.

The evidence generated through this research provides a framework to assist the public and those who practice design thinking to better understand and articulate design thinking. In addition it provides a foundation for further empirical research that explores the realistic application of design thinking in practice and the critical role of the design led professional.

Acknowledgements

Many people talk about a PhD being a solitary journey. The reality is that completing a PhD takes a village. A lot of people pass through, some stay in the outskirts and only a few plant and harvest the fields with you. There are a lot of incredible experiences and also many compromises made.

I am extremely fortunate and incredibly grateful for the amazing people in my village. The generosity, patience, support and encouragement I have experienced through this adventure has been very humbling. It has challenged me as much personally as academically and professionally. It has been crazy, rewarding and has created amazing and unexpected opportunities. The experience has significantly transformed me.

There has, however, been a small group of people who have very specifically impacted me and my PhD journey. These acknowledgements represent just the smallest token of my gratitude to you.

Kate – Thank you for being my writing partner, fellow sense maker, sentence checker, human thesaurus, and pomodoro ninja. More than that, thank you for being my cheerleader and ledge buddy, fellow procrastinator, online shopping expert and my awesome (and constant) companion. Thank you for everything. I really could not have done this without you.

Simon – Thank you for your generosity of time, incredible knowledge and support. I have really valued the amazing (and ridiculous) conversations we've had about design, concepts, wizard sticks, all of it. Thank you for helping me to develop my thinking and work to a whole new level. Thank you for bringing so much depth and lightness to me.

Harriet – I have loved being on a parallel adventure with you. Thank you for being my person who kept me grounded in the 'real world' as we negotiated theory and practice and life together. Thank you for dreaming, laughing and learning with me.

Melis – Thank you for all your magic in the background. You had this incredible ability

to pop in and out with your wisdom at key moments. It never went unnoticed and always resulted in a mini earthquake that sprouted new possibilities. Thank you for investing in me, professionally and personally.

Matt – Thank you for your openness and willingness to go on this journey without knowing the destination. Thank you for providing me space to focus and for all your support.

Jane – You started this journey for me all that time ago when you wowed me with your classes and believed in my potential. Your passion, energy, zest and endless capacity to live and love and be a strong woman have been an ongoing source of inspiration and wisdom for me. I have never stopped learning from you. Thank you.

In addition, some acknowledgements relating specifically to my thesis. First and foremost thank you Gavin and Christine, not just for your supervision and patience throughout my journey but also for your leadership and guidance in seeing me through it from start to finish. Thank you for allowing me to find my own story to pursue and for supporting me through it.

Thank you to my awesome friends who gave up time to read my work and give me critical feedback. Thank you to all my amazing participants and participant organisations for your generosity of time and openness in allowing me to learn from you.

Finally, thank you to everyone who has passed through or joined my village throughout the last four years – you have all played a role in my story.

Declaration

I, Zaana Howard, declare that this examinable outcome:

- i. contains no material which has been accepted for the award to the candidate of any other degree or diploma, except where due reference is made in the text of the examinable outcome;
- ii. to the best of the candidate's knowledge contains no material previously published or written by another person except where due reference is made in the text of the examinable outcome; and
- iii. where work is based on joint research or publications, the relative contributions of the respective workers or authors is disclosed.
- iv. acknowledge Peter Haffenden for his proof reading of this examinable work from the perspective of an individual unfamiliar with the subject matter and his Standard E: Completeness and Consistency editing services in accordance with the Australian Standards for Editing Practice.

Signed:



Date: 22 August 2014

Table of Contents

1 Introduction: Thesis aims and scope of the study.....	15
1.0 Introduction.....	15
1.1 Background to the research.....	15
1.2 The research problem.....	18
1.3 The focus of the research.....	19
1.4 Motivation for the research.....	21
1.5 The structure of the thesis.....	22
1.6 Chapter summary.....	24
2 Taking design thinking into large organisations.....	25
2.0 Introduction.....	25
2.1 Perspectives on design thinking.....	27
2.1.1 Design thinking as a cognitive style.....	27
2.1.2 Design thinking as a general theory of design.....	29
2.1.3 Design thinking as an organisational resource.....	32
2.2 The application of design thinking in practice.....	40
2.2.1 Design thinking process and methods.....	41
2.2.2 The design led professional.....	49
2.2.3 The impact of the environment.....	59
2.3 Chapter summary.....	62
3 Research methodology.....	65
3.0 Introduction.....	65
3.1 Research framework.....	65
3.1.1 A pragmatist approach to research.....	66
3.1.2 The relationship between pragmatism and design.....	69
3.1.3 Case study methodology.....	70
3.1.4 Ethnographic methods.....	74
3.2 Research design.....	76
3.2.1 Overview of studies.....	76
3.2.2 Participant criteria and sampling.....	78
3.2.3 Data collection methods.....	81
3.2.4 Principles of the constant comparative method for data analysis.....	90
3.2.5 Constant comparative method of data analysis in practice.....	95
3.3 Research trustworthiness.....	97
3.4 Chapter summary.....	98
4 Cases in context.....	99
4.0 Introduction.....	99
4.1 Second Road case.....	99

4.1.1 Case context	100
4.1.2 Gaining access to Second Road	101
4.1.3 Participants and recruitment	102
4.1.4 Data collection	103
4.2 Expert Interview study	107
4.2.1 Participants and recruitment	108
4.2.2 Data collection	110
4.3 Deloitte Australia case	111
4.3.1 Case context	112
4.3.2 Gaining access to Deloitte Australia	115
4.3.3 Participants and recruitment	119
4.3.4 Data collection	122
4.4 Chapter summary	125
5 Dimensions of meaning in design thinking	127
5.0 Introduction	127
5.1 Understanding design thinking	127
5.1.1 A lack of consensual definition of design thinking	128
5.1.2 Design thinking as a new name for existing approaches	131
5.1.3 People understand design thinking through the lens of their own experience	132
5.1.4 The aspiration is more important than the definition	133
5.2 Perspectives of design thinking	134
5.2.1 Design thinking as a way of life	135
5.2.2 Design thinking as a way of work	137
5.2.3 Perspective as an indication of maturity	139
5.3 Exploring the purpose and outcomes of design thinking	141
5.3.1 Design thinking for problem solving	142
5.3.2 Design thinking for transformation	144
5.3.3 The aspiration versus the reality	147
5.4 Characteristics of design thinking	148
5.4.1 Interpersonal characteristics	149
5.4.2 Cognitive characteristics	154
5.4.3 Attitudinal characteristics	157
5.4.4 Characteristics related to methods	160
5.4.5 Characteristics in relation to perspectives of a way of life and a way of work	163
5.5 Chapter summary	166
6 Applying design thinking in practice	169
6.0 Introduction	169
6.1 The design thinking approach in practice	170
6.1.1 Outlining the design thinking process	171
6.1.2 Understanding procedures in design thinking	182
6.1.3 Exploring the role of tools within design thinking	196

6.2 The role of the design led professional	206
6.2.1 Facilitator of the design thinking process	207
6.3.2 Design lead	210
6.3.3 Educator in design and participation.....	212
6.3.4 Composer of the design experience	216
6.3 Creating an environment conducive to design thinking	220
6.3.1 The impact of organisational culture on design thinking in practice	221
6.3.2 Establishing a creative and safe space for design thinking	224
6.4 Chapter summary.....	230
7 Mapping perspectives and practice.....	233
7.0 Introduction	233
7.1 Understanding maturity in design thinking	233
7.1.1 A design thinking maturity matrix.....	234
7.1.2 Implications for understanding maturity in practice.....	239
7.1.3 Implications of maturity on quality of outcomes	242
7.2 Mapping design thinking in practice	243
7.2.1 The interrelationship between elements of design thinking in practice	243
7.2.2 A transition in emphasis toward the design led professional	246
7.3 Chapter summary.....	248
8 Conclusions, limitations and further research.....	249
8.0 Introduction	249
8.1 Overview of the research aim and findings	249
8.1.1 Research motivation	249
8.1.2 Research approach.....	250
8.1.3 Research findings.....	251
8.2 Contribution to knowledge.....	255
8.2.1 Justification of the claim of contribution to knowledge	255
8.2.2 Beneficiaries	256
8.3 Limitations of the study.....	257
8.3.1 Consideration of limitations	258
8.3.2 Transferability of research findings	260
8.4 Agenda for further research.....	261
8.5 Concluding remarks.....	263
References	267
Appendix 1: Ethical clearances.....	281
Appendix 2: Research publication list	287

List of figures

Figure 2.1: Cases that use a design thinking approach across industries

Figure 2.2: Comparison of design thinking processes

Figure 2.3: Characteristics of design thinking in literature

Figure 3.1: A pragmatic alternative to the key issues in social science research methodology (Morgan, 2007)

Figure 3.2: Criticisms of case study methodology and strategies for limiting these concerns

Figure 3.3: Data collection timeline

Figure 3.4: Studies and data collection methods in this research project

Figure 3.5: Challenges of participant observation and limiting strategies

Figure 4.1: Second Road participant information

Figure 4.2: Expert interview study participant information

Figure 4.3: Introductory Yammer message

Figure 4.4: Deloitte participant information

Figure 5.1: Definitions and descriptions of design thinking

Figure 5.2: Two perspectives: design thinking as a way of life and a way of work using participant descriptors

Figure 5.3: Design thinking as a way of life is inclusive of design thinking as a way of work

Figure 5.4: An overview of core design thinking characteristics within studies and within the key literature

Figure 5.5: Characteristics of design thinking as they relate to the two perspectives of a way of life and way of work.

Figure 5.6: Summary of dimensions of design thinking within the two perspectives of design thinking as a way of life and way of work

Figure 6.1: Comparison of design thinking processes across studies in comparison with (Brown, 2008)

Figure 6.2: 'Funnel of scope' heuristic

Figure 7.1: Two perspectives of design led and business led within design thinking

discourse

Figure 7.2: Design thinking as a way of work is a subset of design thinking as a way of life

Figure 7.3: Design thinking maturity matrix spectrums

Figure 7.4: Design thinking maturity matrix

Figure 7.5: Assumption of quality of outcome based on perspective of design thinking

Figure 7.6: Three elements of design thinking in practice

Figure 7.7: Novice compared to expert view of design thinking in practice

Figure 7.8: The design led professional in focus within design thinking in practice

1 Introduction: Thesis aims and scope of the study

1.0 Introduction

Design thinking is a collaborative and human centred approach to solving problems (Brown, 2008). This thesis documents an investigation into the conceptual interpretation and practical application of design thinking within large organisations. This chapter outlines the background to the research including explaining thesis aims and motivations for the chosen area of study. Additionally, an overview of the content within this thesis is provided to assist in navigating through the document. This chapter has six sections. Firstly the background to the research (see 1.1) and the research problem (see 1.2) is introduced. Following this, the research focus (see 1.3) and motivation for the research (see 1.4) will be discussed. The structure of the thesis (see 1.5) is then outlined, concluding with a summary of the chapter (see 1.6).

1.1 Background to the research

Design thinking has evolved conceptually and widened in scope over the past half century. It's foundations lie in the design methods movement within design research, which sought to understand how designers think, make decisions and solve problems (Buchanan, 1992; Jones, 1970). From these foundations design thinking evolved to be understood as a more generalised concept to solve complex problems in designing tangible objects and intangible systems (Buchanan, 1992; Kimbell, 2009a). This shift in perspective was accompanied by the emergence of the 'design led professional'; an individual who applies design approaches in their work practices or projects and whose training and experience is not necessarily in design. The design led professional works outside of the 'traditional preoccupations of designers' (Kimbell, 2011, p.285). The

term design led professional is used throughout this thesis to refer to individuals who lead or apply design approaches in their work practices or projects. A design led professional may be a designer – someone who has formal education, training or experience in design, or a non-designer – someone who applies design approaches yet whose formal education, training and experience is outside of design. In addition, within the context of this research, design led professionals may work as an employee of a large organisation, or be consultants or academics whose clientele include large organisations.

In the early 21st century a new articulation of design thinking as an approach for innovation rose to prominence within business and management disciplines. It is this perspective of design thinking that is the focus of this research study. This view understands design thinking as a creative method to solve contemporary and strategic business challenges with or within organisations (for example, Brown, 2008, 2009; Dunne & Martin, 2006; Kimbell, 2011; Martin, 2009). Lindberg, Noweaki & Meinel (2010) refer to design thinking as a meta-discourse for multidisciplinary teams; the suggestion resembles Buchanan's (1992) discussion of design as a liberal art. Over the past decade it is this conceptualisation of design thinking which has increasingly gained attention in business and in diverse contexts for human centred innovation (Banathy, 1996; Bell, 2008; Brown, 2008; Brown & Wyatt, 2010; Duncan & Breslin, 2009; Georges & Romme, 2003; Golsby-Smith, 2007; Holloway, 2009; Jenkins, 2008). As a reflection of these developments Liedtka & Ogilvie (2011) have proposed a separate 'designerly thinking' approach relevant to managers. Design thinking, for the purpose of this research, is defined as a human centred and creative approach for problem solving or innovation.

In this contemporary view of design thinking, the related literature has primarily focused on design thinking's perceived benefits and values, or as an approach discussing processes and tools. This has been accompanied by short reports on how design thinking is applied in practice. Despite enthusiasm, anecdotal cases and

aspiration it is apparent this approach is interpreted in various ways and remains not well understood 'either by the public or those who claim to practice it' (Rylander in Kimbell, 2011, p.288). Thus Seidel & Fixson (2013) note 'Design thinking—and related activities of brainstorming and team reflexivity—all hold great potential, but they are also in danger of merely becoming a collection of management fads if the details of their application are failed to be understood' (p.32). As Sobel and Groeger (2012) state: 'The realistic application and detailed exploration of how design thinking is applied to business is largely absent' (p.7). There is also particular need to develop the debate about the value of design thinking in Australia (Sobel and Groeger, 2013).

The literature provides case studies demonstrating the application of design thinking, however these often focus on one aspect of the approach and are overwhelmingly positive in their claims. Case studies demonstrate limited critique and limited evaluation of the realities of applying design thinking and its sustained viability and implementation within large organisations (for example Boland & Collopy, 2004; Brown, 2008, 2009; Verganti, 2009). To some extent the lack of critique can be attributed to author bias and self-report resulting from authors being representative actors from their organisations and the desire to report success stories (for example Bell, 2008; Clark & Smith, 2010; Sato, Lucente, Meyer, & Mrzaek, 2010). Further, in comparison to small and medium enterprises (see Ward, Runcie, & Morris, 2009), or within the constraints of a project, the transformation of large enterprises is potentially more challenging as organisational culture plays a larger role in determining what is possible.

This opacity has contributed to the value of design thinking being widely debated in industry and academic circles. At one extreme it has been idealised and promoted as a panacea for solving business problems and creating innovation, (Johansson-Skoldberg, Woodilla, & Cetinkaya, 2013) while at the other design thinking has been declared dead and passé as it has been perceived to fail to live up to its potential (Nussbaum, 2011). As Kimbell (2011) asserts:

...design thinking has captured the imagination of practitioners and educators in a range of fields; this widespread interest leads to a discussion of design based more on anecdotes and claims than theoretically or empirically robust arguments (p.300).

This research project contributes to filling this critical theoretical and empirical gap.

1.2 The research problem

The research problem this thesis addresses is the limited understanding of how design thinking is enacted in practice, including what the challenges and opportunities are both in how design thinking is conducted and its outcomes. A core aspect of this problem requires understanding the components of design thinking in practice and their interrelationship. Through making these elements transparent it will provide a framework which can be utilised to create and evaluate design thinking approaches and consider the capability required of the design led professional.

The aim is to address the research problem through the exploration of the research question:

- How does the design led professional understand and enact design thinking in practice?

The word 'enact' rather than 'apply' was chosen purposefully as the word 'apply' denotes implementation of an approach or process and focuses on the approach or process itself. The word 'enact' extends this to also indicate the agency and role of the design led professional in executing all component parts of design thinking in practice. This question then was framed to understand what comprises the component aspects of design thinking in practice as well as the role of the design led professional in its execution. Further, the definition of the word 'practice' within this research is related to the every day routine application of an approach rather than as a theoretical concept. Within the context of this research then 'design thinking in practice' is used

to denote the enactment and application of design thinking as a work practice in context.

By exposing and demystifying how design thinking is enacted in practice, the research in this document aims to contribute to the theoretical and empirical evidence base of design thinking, move beyond anecdotes, and evaluate claims regarding its long-term survival as a concept, a process and a practice. A more comprehensive understanding of design thinking will result in a better understanding of how and to what extent it can contribute to solving complex problems and create sustainable change in organisations. The following section further specifies the focus of this research.

1.3 The focus of the research

The central aim of this thesis is to investigate how design thinking is applied in practice within large organisations. Large organisations within this research are considered to be any business that employs 200 or more people (Australian Bureau of Statistics, 2002). Large organisations were chosen as the focus of this research as, at this scale, the complexity of applying design thinking within a project or integrating design thinking work practices across the organisation is heightened. While large organisations provide the context for the research it is recognised that it is individuals, not organisations, who apply design thinking. As such, design thinking in practice can only be understood in terms of how it is enacted and applied by the design led professional. This is informed by the mindsets, knowledge sets, skills sets and tool sets of the design led professional which is unique to the individual. Finally, the research in this document is especially concerned with the design of intangible products such as systems, services and experiences in large organisations rather than the design of products.

The research question this thesis addresses is: How does the design led professional understand and enact design thinking in practice? Initial research questions for this

project had focused more narrowly on the role of conversation within design thinking. It was noted early in data collection and following the literature review that the depth of the phenomena of design thinking in practice was largely unknown as was the criticality of the design led professional within it. As a result the area of research broadened early in the research process to consider the full scope of the phenomena of design thinking concerned with intangible products within large organisations.

The literature review provided an understanding of the discourses surrounding design thinking as a concept and in practice. Two primary disciplinary sources of literature were used for the review: design and business management literature. Due to the phenomenon being a recent development, with little empirical research, the literature review draws upon popular and semi-academic literature in addition to scholarly research. The idea being to gain a breadth of insight into current understandings and applications of design thinking within organisational contexts. The literature provided a foundation to consider perspectives of design thinking and components of the approach in practice, which provided insights that informed further data collection and analysis.

A qualitative research approach was adopted, involving ethnographic methods of semi structured interviews, artefact analysis and participant observation. Data was collected across three studies: An expert interview study with academics and practitioners across the globe who identify with and practice design thinking; a case study of consultancy Second Road and how they understand and practice design thinking in client engagements; and a case study of professional services firm Deloitte Australia looking at how they are integrating design thinking practices and culture across the organisation. Analysis of research findings, contextualised with relevant literature, exposes the components of design thinking in practice and the impact of the design led professional's design maturity on practice. Design maturity in this thesis refers to the level of design thinking capability and expertise of the design led professional. This

informed the development of two frameworks that model maturity in design thinking and map the elements of design thinking in practice.

This section has detailed the focus of the research within this thesis and identified the research question. That being: How does the design led professional understand and enact design thinking in practice? This question guided the research conducted across the three studies and provided a mechanism to structure and conceptualise research findings. The next section will briefly outline the motivations for this research.

1.4 Motivation for the research

The motivation for this research derives from three considerations:

- i. The limited academic research examining aspects of design thinking in practice means there is a limited empirical basis coming out of design, and business and management, related to the focus of the research; and
- ii. Related to (i) is the desire to develop an understanding of how design thinking is enacted in practice and the capability requirements of the design led professional such that this can subsequently better inform design thinking practice. As Rylander (2009) has noted 'a better understanding of design thinking as problem solving and how value is created by designers could help in broadening the knowledge economy rhetoric and theories on knowledge work' (p.17).
- iii. In regard to personal motivation the author is a trained information and knowledge manager with no formal design education. Working within knowledge management in large organisations enabled the development and application of a range of skills and sensibilities related to design thinking;, such as human centredness, collaboration, facilitation, and harnessing complexity. Consequently when the author happened upon design thinking in 2008 its potential for positive change in organisations

through its focus on people and creative approach was recognised. The author investigated and began to trial processes and tools within her own work practice but always felt a gap in her design skill and knowledge. This resulted in the development of an academic interest in design thinking in practice including the role and in turn capability requirement of the design led professional.

These motivations were underpinned by a desire to develop research that has potential for practical value and application for organisations and design led professionals. The following section will outline the structure of this thesis.

1.5 The structure of the thesis

This section summarises the structure of the eight chapters of this thesis:

Chapter 1 Introduction: Thesis aims and scope of study provides background and context to the research documented within this thesis. It explains the motivation for the area of study and outlines the aims of the research. A brief overview of the content of the thesis is also given.

Chapter 2 Taking design thinking into large organisations presents a literature review of how design thinking is understood as a concept and in practice. It identifies varying perspectives on design thinking across design, business and management literature. This provides a foundation to critically consider design thinking in practice, focusing on the perspective of design thinking as an innovation approach for organisations. Within this context it is argued design thinking is portrayed idealistically, simplistically and generally with limited empirical insight into practice. This portrayal identifies the opportunity from which this research is founded.

Chapter 3 Research methodology contains a detailed discussion of the qualitative research approach for the three studies. The approach is informed by case study methodology and ethnographic methods, and consideration of their theoretical background and justification for use is also presented. A description of the research design follows, outlining the overarching participant sampling,; data collection methods of semi structured interviews, participant observation and artefact analysis,; and the constant comparative analysis method for the three cases. An overview of considerations for research quality concludes the chapter.

Chapter 04 Studies in context details the background and research procedures for each of the three studies. This details gaining access to organisations and participants, participant recruitment and information, and data collection procedures. Furthermore this chapter provides the aims for each study and the contextual information regarding the organisational background and environment.

Chapter 05 Dimensions in understanding design thinking presents findings and discussion of the research data across the three studies in relation to understanding design thinking. Four emergent categories are presented: defining design thinking, perspectives on design thinking, purpose and outcomes of design thinking and characteristics of design thinking. These four categories are contextualised with appropriate literature to provide a theoretical base for the discussion of findings. This presents a deep understanding of design thinking as a concept, which then provides a foundation for considering the components of design thinking in practice.

Chapter 06 Applying design thinking in practice presents analysis and discussion of the research data across the three studies in relation to how design thinking is enacted in practice. Three categorical components of design thinking in practice emerged: the approach to design thinking, the role of the design led professional, and considerations of the environment in which it is conducted. These are then considered with relevant

literature to critically discuss findings and present a complex representation of design thinking in practice.

Chapter 07 Mapping perspectives and practice describes the development of two models that summarise and draw together findings and discussion. One model considers the impact of design maturity on outcomes. The second framework maps design thinking in practice and considers the implications for the interdependent relationship between the three components of the approach to design thinking, the role of the design led professional, and the environment in which it is conducted. These models communicate a rich picture of design thinking within organisations.

Chapter 08 Conclusions, limitations and further research provides conclusions to the research contained within this thesis. It discusses how the research performed against the aims, including interpretations of findings and the contribution to knowledge. The limitations of the research design are also presented along with an agenda for further research. The chapter concludes with final remarks regarding the body of research contained within this thesis.

Finally, this thesis concludes with bibliographic references and appendices.

1.6 Chapter summary

This chapter has outlined the background to the research contained within this thesis. It explains the motivation for conducting the research, the problem it aims to address, and has specifically identified the research questions at the core of this research. The chapter further provides a brief overview of the thesis contents and gives a summary of each chapter. This aims to assist the reader in navigating through the material presented. The following chapter will contextualise this research within the design thinking literature.

2 Taking design thinking into large organisations

2.0 Introduction

This chapter presents a literature review of design thinking to provide insight into current understandings of design thinking as a concept and in practice. In particular it focuses on design thinking as an approach for innovation within the context of large organisations and critically discusses how design thinking in practice is understood. As noted above, design thinking has been widely debated in industry and academic circles. This has ranged from design thinking being idealised and promoted as a panacea to solving business problems (Johansson-Skoldberg et al., 2013), to it being declared dead and passé (Nussbaum, 2011). As such, it is timely to explore how it is being mobilised for the purpose of developing innovation.

This literature review is divided into two categories:

- Perspectives on design thinking (see 2.1): A detailed examination of three discourses on design thinking - as a cognitive style, as a general theory of design and as an organisational resource.
- The application of design thinking in practice (see 2.2): Current understandings of design thinking in practice, including how and why it is being applied within large organisations, will be extrapolated from the literature. It considers how agencies are applying design thinking on projects with clients from large organisations, as well as how large organisations are embedding design thinking in their culture and work practices. Also considered are the process and tools used, the role of the design led professional and the environment within which design thinking is conducted.

Two main sources of literature were used for this review: literature specific to design thinking and literature from broader design theory and research. The nature of the literature under review represented three key challenges:

- The majority of the literature discussing the application of design thinking in organisations is popular or semi-academic. It focuses on providing idealistic ideas and presenting well formed stories of successful outcomes with little scholarly insight into how these outcomes were achieved through the use of design thinking in practice.
- Scholarly literature in the area primarily considers design thinking conceptually; describing its perceived benefits and values or discussing it as an approach focusing on its associated process and tools. There is little available that empirically investigates how design thinking is conducted at a practice level with the context of large organisations.
- The broad scope of literature in the field of design is vast. Literature from design theory and research was selected if it specifically addressed design thinking. This literature is primarily drawn from the three discourses of design thinking attended to within this review. Design thinking as a cognitive style is primarily situated within disciplines such as architecture, engineering and industrial design. Design thinking as a general theory of design draws upon scholarly work within design theory and methodology. Finally, design thinking as an organisational resource is founded within contemporary literature commencing in the early 21st century situating design within business and organisational contexts.

This review will conclude by summarising areas for development in the literature relating to design thinking and highlighting the argument for the research in this thesis.

2.1 Perspectives on design thinking

This section presents discourses on the concept of design thinking to provide a foundation for the research in this thesis. Following Kimbell (2011), three perspectives of design thinking are discussed: as a cognitive style, a general theory of design and as an organisational resource (Kimbell, 2011). Further discourses have since emerged surrounding the definition of the term (see Johansson-Skoldberg et al., 2013; Sobel & Groeger, 2013). For the purpose of this research however Kimbell's (2011) three perspectives of design thinking have been adopted as a practical aid to structure and review the literature. These discourses are present in the design literature, business and management literature, and elsewhere; for example systems theory (Johansson-Skoldberg et al., 2013). While overlaps and relationships exist, each discourse is largely independent.

This section will commence with a brief discussion of the scholarly design discourse that relates to design thinking as a cognitive style amongst designers. Following this, focus will shift to understanding design thinking as a general theory of design. Finally, the more recent development of design thinking as an organisational resource will be discussed. This section will then conclude with outlining a definition of design thinking within this context of organisations for the purpose of the research within this thesis.

2.1.1 Design thinking as a cognitive style

The origins of design thinking emerged from the design methods movement within scholarly design research (as discussed in Buchanan, 1992). This stream of research developed in the 1960s and focused on understanding the processes and methods used by designers when they engage in design activity (Cross, 2001). This grew to include investigations to understand the cognitive processes and methods by which successful and expert designers solve problems (for example Cross, 1982; Cross, 2001; Kimbell, 2011).

Design thinking as a cognitive style primarily explores how design experts make decisions, with this being named 'design thinking'. Design thinking, as a term, was first noticeably used by Rowe (1987) in his studies of the thought processes of designers in action within architecture and urban planning. Rowe's (1987) goal was to develop a general picture of design thinking which he describes as the 'interior situational logic and the decision making processes of designers in action, as well as the theoretical dimensions that both account for and inform this kind of understanding' (p.2). The work of Cross (2006) is similar and built on the tradition initiated by Rowe (1987) and others. In his research of industrial designers he termed the designer's thought process in action as 'designerly ways of knowing', which is particularly relevant to the disciplines of industrial design, architecture, engineering and product design. As these disciplines are primarily tangible in their output and outcomes, this body of research, while generally relevant, is insufficient in understanding the design of complex intangible systems and services in which human behaviour and emotion are a significant component.

According to Kimbell (2011): 'while there has been a sustained effort to understand and describe what professional designers do in their design work, this has not yet generated a definitive or historically-informed account of design thinking, nor any explanation for why they might have a particular cognitive style' (p.292). While Kimbell's (2011, 2012) argument is well evidenced she uses this as a platform to assert a practice theory basis for understanding professional designers and their expertise rather than design thinking. She argues that design thinking is a problematic term that over privileges the role of designers and cognition as per the work of Cross (2006) and others. In doing so, Kimbell (2009a) believes it under privileges co-constituent involvement, the situated character of knowledge production, the embodied nature of design work and the role of the artefact. These represent two different agendas; where Cross focuses more on a designer's conception of product prototypes and aesthetic modelling, Kimbell focuses on the practice of designing. Perhaps not surprising as Kimbell works in the service design and social innovation fields.

Kimbell (2012) may underestimate the degree of consensus on designerly ways of knowing but her focus is more appropriate to the design of systems and services. She uses the terms design-as-practice and design-in-practice to describe different types of practice in designing (Kimbell, 2009a, 2011). Design-as-practice focuses on design as a situated, embodied and distributed accomplishment, involving people (beyond just professional designers) and artefacts (Kimbell, 2012). In comparison, design-in-practice acknowledges 'the emergent nature of design outcomes as they are enacted in practice' (Kimbell, 2009a, p.11), acknowledging the possibility of multiple design solutions throughout the social process of designing (Kimbell, 2012). This terminology provides an extension to descriptions and understandings of the concept of design thinking through separating it into two components where one is focused on the practice of designing and the other on the outcomes of the process.

Insight into design as a cognitive style and Kimbell's (2012) concepts of design-as-practice and design-in-practice provide a basis for understanding design thinking as an organisational resource. Within the context of the research in this thesis the focus is more toward design-as-practice, understanding the elements and interrelationship that comprise the situated practice of design thinking. These ideas also complement the next section on design thinking as a general theory of design.

2.1.2 Design thinking as a general theory of design

A second discourse on design thinking within the design literature is as a general theory of design. This provides context for research in this thesis as it advocates design as a liberal art. In this, it extends design thinking from aesthetic modelling to wicked problem solving and beyond the exclusive domain of design and the designer to the notion that all professionals design (Buchanan, 1992; Owen, 2007; Simon, 1969). The idea builds primarily on claims about design in the broadest sense by Herbert Simon (1969). As shown below this idea is not without its problems.

In Buchanan's (1992) seminal paper, *Wicked problems in design thinking*, he moved design thinking to a more generalised theory of design or 'liberal art' that could be applied to any tangible object or intangible system (Kimbell, 2009a). In particular Buchanan draws upon the work of Rittel & Webber (1973) to argue most design problems are wicked problems: 'a class of social systems problems with a fundamental indeterminacy without a single solution and where much creativity is needed to find solutions' (Johansson-Skoldberg et al., 2013, p.125). Rittel and Webber's (1973) original work however originated from urban planning and design. Buchanan (1992), like others, extends the wicked problem formulation to all design fields, with little discussion or justification. On reflection it is not clear that the nature of all design problems, whether tangible or intangible, generate the 'wicked' demands that Rittel & Webber (1973) identify for planning. Kolko (2014) suggests a nuanced picture of design potentially contributing to the solution of social problems. He states:

Based on these characteristics, not all hard-to-solve problems are wicked, only those with an indeterminate scope and scale. So most *social* problems—such as inequality, political instability, death, disease, or famine—are wicked. They can't be "fixed." But because of the role of design in developing infrastructure, designers can play a central role in mitigating the negative consequences of wicked problems and positioning the broad trajectory of culture in new and more desirable directions (para. 3).

This understanding of wicked problems has flowed into the literature of design thinking as an organisational resource and is often used to describe any design problem rather than a particular type of problem (for example Martin, 2009). Buchanan (1992) however was advocating for the ability of a 'design approach' to solve highly complex problems with complicated environments and ecosystems and suggesting that there is more to design than simple problem solving or iterative innovation (Kimbell, 2011). In fact many intangible systems and social problems may be wicked and it is here that design approaches can help. This is not the same as saying that design is fundamentally about wicked problem solving.

Further, Buchanan (1992) argues that all professions have aspects of design within them, suitable for solving the complex problems of humans. This follows the work of Simon (1996), who is frequently cited in design thinking literature for his suggestion that 'everybody designs who devises courses of action aimed at changing existing situations into preferred ones' (p.111; see Beckman & Barry, 2007; Boland & Collopy, 2004; Buchanan, 1992; Cross, 2001; Cross, 2006; Dunne & Martin, 2006; Kimbell, 2009). Simon (1969) believes the process of design is a central knowledge domain in all professions including engineering, management, education and medicine. In his work he was advocating for the integration of a design curriculum in higher education concerned with 'what ought to be' as a complement to the natural sciences curriculum concerned with 'how things are' (Simon, 1996). Within design discourse Owen (2007) and Buchanan (1992) have raised these influential ideas of Simon's (1969), from artificial intelligence and behavioural economics, to demonstrate the broader value of design and posit it as complementary to science and as a useful underpinning discipline for all professions.

This argument from Simon (1969, 1996), Buchanan (1992), and Owen (2007), that all professions have design within them, also results in the notion that design is not the exclusive domain of designers, but can be executed by any person. This idea is implicitly carried by Brown (2009) into design thinking rhetoric within business literature. He provides Thomas Edison and Henry Ford as examples of design thinkers who both predate the concept and are not design trained. Through naming their working styles as design thinking he implies that all innovators in general share the capacity for design thinking as an innate capability of working systematically and with vision. How exactly this applies to design thinking and the current practices of its application remains to be seen.

2.1.3 Design thinking as an organisational resource

In the early 21st century design thinking became situated in business as an approach for innovation and to solve some of the challenges organisations are facing (Brown, 2008; Kimbell, 2011). This third discourse, on design thinking as an organisational resource for innovation and problem solving, while much discussed, is the least understood. This view of design thinking became commoditised and put into practice before the concept was defined. This is supported by Martin (in Dunne & Martin, 2006), who stated: 'Even as managers are adopting these approaches, academics and practitioners are attempting to define them' (p.512). Further, books and papers addressing this perspective on design thinking mostly ignore academic literature from other design thinking discourses (see Badke-Schaub, Roozenburg & Cardoso, 2010; Dorst, 2010; Liedtka, 2013; Johansson-Skoldberg et al., 2013). This body of literature also draws minimally from other disciplines or discourses such as management research, organisation studies or social science traditions (Kimbell, 2011). As a result the literature is largely semi-academic and practitioner led, originating from personal experience or opinion that provide anecdotes or limited insights (for example, Berger, 2009; Brown, 2009; Esslinger, 2009; Liedtka & Ogilvie, 2011; Lockwood, 2009; Verganti, 2009). This section will unpack current understandings and definitions of design thinking as an organisational resource, which is the focus of this research project.

2.1.3.1 Emergence of design thinking as an organisational resource

Within the context of business and innovation, the popular usage of the term design thinking originated from the design and innovation consulting firm IDEO in the early 21st century. The concept of design thinking at IDEO was used to explain what designers do (Brown & Wyatt, 2010). Brown, Chief Executive Officer of IDEO, rose to be a major proponent of design thinking, arguing its value in innovation for the purpose of facing organisational and global challenges (Badke-Schaub, Roozenburg, & Cardoso, 2010). He explores the concept based on his experiences and IDEO's work, yet with limited reference to other research (Sobel & Groeger, 2012). This lack of

attention to preceding discourse has added to the debate of where the value of this perspective of design thinking lies, as it has little theoretical or historical depth (for example Dorst, 2010).

The emergence of this design thinking discourse also coincided with a number of influential management books that raised the awareness of design or creativity in business more broadly. These included Malcolm Gladwell's *The Tipping Point*, Tom Kelley's *The Art of Innovation*, Richard Florida's *The Rise of the Creative Class*, and Daniel Pink's *A Whole New Mind* (Cooper, Junginger, & Lockwood, 2009). The value of creativity and design in business was popularised from these texts. In addition, Roger Martin, then Dean of the Rotman School of Management in Toronto, rose as a second major proponent of design thinking from the business and management discipline. Martin's contribution aided adoption of design thinking within management discourse and business schools (Kimbell, 2011). Further, corporate business and management began embracing design thinking for its potential to deliver competitive advantage through aiding innovation, differentiating their brand, and bringing products and services to market faster for the purpose of maintaining or growing market share (Brown, 2008; Kimbell, 2011). Despite this interest in design from business and management there is little acknowledgement of, or contribution to, previous discourses (for example, Brown, 2009; Fraser, 2009; Holloway, 2009; Jenkins, 2008; Martin, 2009).

While the literature from both business and design disciplines provide case studies (for example Boland & Collopy, 2004; Brown, 2008, 2009; Verganti, 2009) that demonstrate the application of design thinking, these are overwhelmingly positive in their claims and demonstrate little critique or evaluation of design thinking in practice. One example of this is Sato, Lucente, Meyer and Mrazek (2010) who discuss how they integrated design thinking into the organisational change and development processes at Hewlett Packard to 'deliver business results' (p.45). They overview, at a high level, their success in using design thinking to build experience design capabilities across the

company and to increase the organisation's responsiveness to change. There is little insight however into how this actually occurred in practice. Rather the article focuses on describing Hewlett Packard's version of design thinking and how it relates to other organisational change and development models. Thus, Kimbell (2011) argues: 'design thinking has captured the imagination of practitioners and educators in a range of fields; this widespread interest leads to a discussion of design based more on anecdotes and claims than theoretically or empirically robust arguments' (p.300). It is evident aspirations for design thinking are high however it is still not well understood, 'either by the public or those who claim to practice it' (Rylander in Kimbell, 2011, p.288).

The value design thinking brings to an organisation is 'a different way of framing situations and possibilities, doing things, and tackling problems: essentially a cultural transformation of the way it undertakes its business' (Bucolo, Wrigley, & Matthews, 2012, p.18). This perspective is often advanced as a panacea to organisational and social problems, encompassing 'everything good about designerly practices' (Kimbell, 2011, p.289) and as 'practical, real, concrete, entrepreneurial and agile, and most important of all "human-centred"' (Blyth & Kimbell, 2011, p.7). This has resulted in design evolving from a focus on 'artefacts and aesthetics...to the much wider social space of systems and society...at a key moment in time' (Nussbaum, 2011, para.7). It has gained interest across a diverse range of industries and disciplines. This includes (see Figure 2.1) within business for strategy (Dunne & Martin, 2006; Golsby-Smith, 2007; Holloway, 2009; Liedtka, 2001) and organisational design (Banathy, 1996; Body, 2008; Fraser, 2009; Jenkins, 2008; Georges & Romme, 2003; Sato et al., 2010); healthcare (Brown, 2008; Duncan & Breslin, 2009); social innovation (Bell, 2008; Brown & Wyatt, 2010); and across all sectors of education (Domschke, Bog, & Zeier, 2009; Dym, Agogino, Eris, Frey, & Leifer, 2006; Kangas, Seitamaa-Hakkarainen, & Hakkarainen, 2012; Razzouk & Shute, 2012; Riverdale County School & IDEO, 2011).

Industry	Key references
Business - strategy	Dunne & Martin, 2006; Golsby-Smith, 2007; Holloway, 2009; Liedtka, 2001
Business – organisational redesign	Banathy, 1996; Body, 2008; Fraser, 2009; Jenkins, 2008; Georges & Romme, 2003; Sato et al., 2010
Education (kindergarten – year 12 and higher education)	Domschke, Bog, & Zeier, 2009; Dym et al., 2006; Kangas, Seitamaa-Hakkarainen, & Hakkarainen, 2012; Razzouk & Shute, 2012; Riverdale County School & IDEO, 2011
Healthcare	Brown, 2008; Duncan & Breslin, 2009
Social innovation	Bell, 2008; Brown & Wyatt, 2010

Figure 2.1: Cases that use a design thinking approach across industries

2.1.3.2 Defining design thinking

The concept of design thinking as an organisational resource has been evolving and coalescing over the past decade (Georges & Romme, 2003; Martin, 2009). While disparity exists within the literature the sentiment is consistent:

1. Design thinking is used for the purpose of problem solving or creating innovation; and
2. Design thinking is human centred, putting the needs of people first (for example Bell, 2008; Brown, 2009; Cooper et al., 2009; Holloway, 2009; Kimbell, 2011; Liedtka & Ogilvie, 2011; Lockwood, 2009).

It is generally viewed as a collaborative and iterative process that moves from generating insights about end users, to idea generation and testing, to implementation. Further, it is understood as an integrated approach with participation and engagement at the core (Brown & Wyatt, 2010).

While definitions are related in that they all indicate innovation or problem solving, each has varying subtle emphases. Design thinking, for Duncan and Breslin (2009) within the health environment, represents an approach to creative problem solving. In comparison, Holloway (2009) from within business defines it as how designers typically

approach problem solving. Martin (in Dunne & Martin, 2006) extends this within the context of management, where design thinking is 'approaching management problems as designers approach design problems' (p.512). In this Martin (in Dunne & Martin, 2006) and Holloway (2009) present design thinking from the perspective of a cognitive style rather than exploring some of the 'more tactile elements of design thinking such as the empathetic and human-centred approach to design' (Sobel & Groeger, 2012, p.12-13).

In the same interview, Martin later acknowledges design thinking as collaborative integrative thinking that uses abductive logic, which is more aligned with the perspective of design thinking as an organisational resource (Dunne & Martin, 2006). This mixed view and definition that Martin demonstrates within his own work is also present in Brown's (2008) work. Brown (2008) defines design thinking as 'using the designer's sensibility and methods to match people's needs with what is technologically feasible and what a viable business strategy can convert into customer value and market opportunity' (p.85). Within the same article he goes on to describe design thinking as a methodology, discipline, tool and approach. This implies a lack of clarity in the scope and scale of design thinking where considering it a tool is very different to considering it a discipline. This demonstrates that articulating design thinking, regardless of the disciplinary perspective of management (see Dunne & Martin, 2006) or design (see Brown, 2008), is a challenge.

Another issue in defining design thinking is the supposed distinction between design thinking and design doing, where design thinking is perceived to privilege thinking over action (Cooper et al., 2009). Literature is divided on this, either viewing design thinking and design doing as two separate entities (for example Cooper et al., 2009) or acknowledging design thinking as both (for example Bell, 2008; Nelson and Stolterman, 2013). Furthermore design thinking is at times equated to creativity, in particular as a way to assist managers to think more innovatively (Johansson-Skoldberg et al., 2013). For example, Nussbaum (2011, para. 3) presents design thinking as a process that

'promised to deliver creativity' for the purpose of innovation. As such it has been questioned if proven concepts, including creativity, invention or innovation, may be equally if not more sufficient terms for the phenomenon (Kimbell, 2009a).

Overall, design thinking has become popular globally. At present, while there is an alignment in sentiment regarding the definition of design thinking, there is uncertainty as to what it can achieve and to what level. This can be seen in the design research community where multiple perspectives and rich pictures of design thinking are preferred from fear of oversimplifying the concept (Dorst, 2011), yet with limited insight into its accomplishments. For example, Buchanan (1992) represents design thinking as a holistic and meta approach that can be applied within any context and intersects all other design and cognitive disciplines, describing its potential for what it could achieve without tangible examples. In contrast business and management perspectives, while more widely available and accepted, are often diluted and simplistic in the way design thinking is discussed, (Dorst, 2011) with thin descriptions of its use. The lack of clarity in regard to its value and ability to affect change however has caused debate as to whether it is a passing fad, with some even declaring it dead (for example Nussbaum, 2011). Design thinking, within this perspective, remains undertheorised and understudied with 'the critical rethinking of design thinking' just beginning (Kimbell, 2011, p.301). One aspect of understanding this value is in considering how design and design thinking contributes to existing thinking traditions from the sciences and humanities.

2.1.3.3 Design thinking as the 'third way'

Design is posited as the third culture of thinking, complementing the sciences and the arts through its pragmatic orientation (Dalsgaard, 2014) that is 'directed toward desired situations and systems and toward synthesis in the form of actual actions' (Georges & Romme, 2003, p.562). Martin (2009) also puts design thinking forward as this 'third way' or 'balanced view' with similar sentiment. He argues design thinking seeks to resolve the conflicts between traditional science and humanities (a category

of the arts) dichotomies of analytical and synthetic thinking; inductive and deductive reasoning; reliability and validity; exploitation and exploration. In this way, design thinking is considered to provide a balanced pathway between science and the arts, and in doing so is complementary to traditional decision making (for example Brown, 2009; Leidtka in Boland & Collopy, 2004; Holloway, 2009).

Further to this relationship to science and the arts, Owen (2007, p.22) considers the design attitude as a complement to traditional business attitude. He discusses the value of this combination of design and business as the 'best of skeptical inquiry into balance with imaginative application'. Boland and Collopy (2004) agree that the design attitude is able to deal with uncertainty and ambiguity within problems, and a business attitude is suited for known stable problems. They posit that leaders then need to be both designers and decision makers (Boland & Collopy, 2004; Kimbell, 2009a). As Romme (2003) and others also note, this approach focuses on the fundamentally pragmatic nature of design (thinking), i.e. an action-oriented focus on resolving organisational issues through envisioning change and working towards it.

In a related vein, others posit design thinking as not a decision of 'either/ or' between science and the arts thinking but instead 'and'. This is apparent in Brown's (2009) work where he states 'nobody wants to run a business based on feeling, intuition and inspiration, but an overreliance on the rational and the analytical can be just as dangerous'. He presents design thinking as the 'third way' that integrates both. Similarly, Leidtka (in Boland & Collopy, 2004, p.196) argue that 'one of the greatest advantages in applying design thinking to business practice is that it forces us to incorporate both the art and the science of hypotheses generation and testing'. Design thinking then is not about choosing one way but instead accepting and moving between rational and intuitive thinking at the point each is relevant in organisational processes. It does this through values and ideas of possibility, participation, and experimentation, focusing on what can be done to, referencing Simon (1969), 'change existing organisational systems and situations into desired ones' (Georges & Romme,

2003, p. 559). More than this, Nelson and Stolterman (2013) argue design is inclusive of aspects of the sciences and arts, yet also with its own foundations and culture. This places design thinking in the distinct position of being an integrative framework that both brings the arts and sciences together, being able to move between them (Liedtka, 2013) and also extending them.

Summary

This section has presented varying discourses that have used the term 'design thinking' over time to provide an understanding of the origins and foundations of design thinking. Three discourses were discussed of: design thinking as a cognitive style; design thinking as a general theory of design; and design thinking as an innovation or problem solving approach in organisations. Design thinking as a cognitive style emphasises how design experts make decision. Design thinking as a general theory of design focuses on design as a liberal art underpinning all professions, which can be executed by any person. While these are independent discourses from the third discourse of design thinking as an organisational resource, they provide a historical foundation from which to understand this most recent phenomenon. A critique of design thinking descriptions and definitions from all three discourses has been provided to give context for the research within this thesis.

Several weaknesses in understanding design thinking as an organisational resource were identified. First, there is little empirical depth to the literature as the majority of it is based on experience and opinion, and is semi academic or practitioner led (for example, Bell, 2008; Body, 2008; Brown, 2009; Holloway, 2009; Jenkins, 2008). Second, due to the semi academic and practitioner led nature of the literature, authors are focused on reporting out positively on their work rather than critically. As a result, design thinking is often idealistically portrayed as a panacea to innovation and for solving complex organisational problems. While not the 'failure' commentators such as Nussbaum (2011) state, it has not lived up to its potential to date with few evidenced

success stories (Blyth & Kimbell, 2011; Kimbell, 2011), which indicates potential issues in its representation and application. Finally, there is little consensus on a definition of design thinking or understanding of its value and benefits. While core characteristics can be identified at a high level it is difficult to distinguish design thinking from other kinds of professional knowledge or disciplines as it is an integration of aspects of several known ways of working (Badke-Schaub, Roozenburg & Cardoso, 2010; Kimbell, 2011)(see also 2.2.2.2). Further, descriptions indicate a scale of perceptions of design thinking from a tool or process to a holistic approach for problem solving. This has implications for both conceptual understanding and in practice that are investigated within this research.

For the purpose of the research within this thesis the following definition for design thinking, compositely drawn from the discourse which views design thinking as an organisational resource for innovation and problem solving, will be used: 'Design thinking is a human centred and collaborative approach to problem solving and innovation'. From this point forward when the term design thinking is used in this thesis it will relate specifically to this definition, and when reference to the design thinking literature is made it will refer to this discourse of design thinking as an organisational resource unless otherwise indicated. The next section will build upon this to develop an understanding of how design thinking in practice is portrayed in the literature.

2.2 The application of design thinking in practice

This section explores how design thinking is conducted in practice. It will show the primary focus of design thinking literature considers design thinking at either a conceptual or process level. Further it will demonstrate that the majority of design thinking success stories are presented with limited detail into how design thinking is practically applied within organisations, or what constitutes design thinking in practice. Instead case studies primarily focus on the success of the outcomes rather than how

the outcomes are created and achieved (Chang, Kim, Joo, 2013). This aligns with the work of Sobel and Groeger (2012) who states: 'The realistic application and detailed exploration of how design thinking is applied to business is largely absent' (p.7).

Three aspects that comprise design thinking in practice will be discussed. First, this section will commence with exploring perspectives on the process of design thinking. Following this, the design led professional will be discussed; including their mindset, characteristics and the roles they enact within design led projects. Finally considerations for the environment in which design thinking is conducted will be presented. While these three components can be identified within literature they are never explicitly discussed together. Understanding design thinking in practice as comprising an interdependent relationship between these three areas provides a richer understanding of design thinking and considerations for comprehending aspects of quality and success of outcomes.

2.2.1 Design thinking process and methods

There is no one authoritative or standard design thinking process. Some uniformity exists across process steps and tools (Liedtka, 2013) however terminology for these vary. This section commences with a discussion and comparison of design thinking processes. This is followed by examining implications for a focus on process rather than a deeper understanding of practice.

2.2.1.1 Alignment in the design thinking process

Design thinking processes in the literature typically present between three to five stages (see Figure 2.2). Regardless of the number or naming of stages the underlying process is largely uniform where design thinking broadly follows a design process. The design process can be depicted as linear and divided into two distinct phases: problem definition and problem solution. This 'nearly always begins with analytic phases of

search and understanding, and ends with synthetic phases of experimentation and invention' (Owen in Beckman & Barry, 2007, p.27).

Critics were quick to point out the weakness in this simplistic description instead highlighting the design process as non-sequential with no predefined steps (Buchanan, 1992). Following this and in relation to design thinking specifically, Dorst & Cross's (2001) findings demonstrate the co-evolution of understanding the design problem and creating solutions throughout the process is more representative of practice. They found that while definite stages can be identified, there is no predetermined manner in which these should be navigated as this will be influenced by the problem and context. Brown's (2008) work aligns with these findings, where he suggests considering the process stages as a system of three spaces that demarcate related activities, to move through, back and between for iterative purposes.

Variances across the literature in the design thinking process indicate emphases placed within the process rather than a fundamental shift in the process itself. It also potentially highlights author agendas to create individual versions and interpretations of the process, rather than build upon the existing evidence base. Brown's (2008; 2010) three stage process of inspiration, ideation and implementation is used in Figure 2.2 as a comparison point to illustrate the similarities and differences in alignment of processes represented in key literature. The broken lines in the table indicate Brown's (2008; 2010) three stages to facilitate comparison of understanding other processes in relation to his.

Inspiration

In Brown's (2008, 2009), model Inspiration considers the context and gathers insights from every possible source. While named differently, this stage directly correlates with Fraser's (2012), Holloway's (2009), Liedtka & Ogilvie's (2011), and Martin's (2009) process models. In this stage focus is on research and problem finding, sometimes referred to as the 'fuzzy front end' due to the 'ambiguity and chaotic nature that characterises it' (Sanders & Stappers, 2008, p.7). For example, Holloway (2009)

emphasises a 360 degree understanding of the problem from customer tacit and explicit needs, to the end user environment, social factors, emerging trends and market considerations to ensure the right question and problem is being addressed. The most common differentiation within process models is for this phase to be split into two stages: one that focuses on research and understanding the problem, and the other on determining insights and defining the problem (for example Bell, 2008; Clark & Smith, 2010; Duncan & Breslin, 2009; Dym et al., 2006; University, 2010). Regardless of whether this stage is depicted as one or two phases, there is alignment in regard to its objectives and activities.

Author	Perspective	Design thinking stages			
Brown (2008)	Industrial designer working as CEO of design and innovation consultancy IDEO	Inspiration	Ideation	Implementation	Implementation
Fraser (2009)	Academic and consultant in management and business design	Deep user understanding	Concept visualisation	Strategic business design	Strategic business design
Martin (2009)	Academic in management with a focus on competitive advantage in business.	Mystery	Heuristic	Algorithm	Algorithm
Duncan & Breslin (2009)	Practitioners in the health sector, Centre for Innovation at the Mayo Clinic.	Topic framing	Research	Design	Development
Clark & Smith (2008)	Practitioners working with the experience design process at technology company IBM.	Understand	Observe	Conceptualise	Implement
Liedtka & Ogiwie (2011)	Academics in management and consultants in business.	What is?	What if?	What wows?	What now?
IDEO (Bell, 2008)	Design and innovation consultancy working across numerous sectors	Understand	Observe	Visualise	Implement
Beckman & Barry (2007)	Academics in business and mechanical engineering respectively. Model developed from empirical research with students.	Observation/ Problem finding	Framework/ Problems selecting	Imperatives/ Solution finding	Solution selecting
Dym et. al. (2006)	Academics in engineering education developed from empirical research with students.	Observation	Inquiry	Learning	Learning
Stanford University (2010)	Developed by the Stanford Design School for higher education and corporate education.	Empathise	Define	Ideate	Prototype Test
Holloway (2009)	Practitioner using design thinking at technology company SAP.	Problem definition	Idea generation	Visualisation	Prototyping

Figure 2.2: Comparison of design thinking processes

Ideation

Following this, Ideation within Brown's (2008, 2009) model is the process of generating, developing and testing ideas that may lead to new solutions. While there is greater divergence amongst the processes in regard to the number of steps within this stage (see Figure 2.2), all processes commonly depict the generation of ideas, prototyping and testing to decide on a final solution. While prototypes and how they are tested is often discussed in the literature (for example Duncan and Breslin 2009; Holloway, 2009), processes for idea generation and concept selection are discussed less so. Idea generation often involves forms of brainstorming to generate a wide range of solutions, including group or individual brainstorming, sketching and using word association (Beckman and Barry, 2007). The goal is to generate a wide range of solutions which can then be refined, mixed and matched to generate a feasible set of options to prototype and test.

Implementation

It is when the final stage in Brown's (2008, 2009) model of Implementation is considered that any significant divergence in process frameworks across the literature occurs. For Brown (2008, 2009) implementation includes the development of the product into an action plan for market. Carlgren (2013) from her empirical research found that an organisation's view on innovation affects the use of design thinking, particularly if it is used at the front end of innovation or throughout the entire process. Across the literature, process models that include a form of implementation often still emphasise the stages of inspiration and ideation. As a result, an uneven balance exists in the literature toward these first two phases. For example, Beckman and Barry (2007) explicitly state that 'Identifying, framing and reframing the problem to be solved is as important in this process as solving the problem or finding an appropriate solution' (p.44).

While Beckman and Barry (2007) discuss and depict an equal balance between the four stages of problem finding, problem selecting, solution finding, solution selecting in their design thinking based innovation process this is not the case on closer

examination. Instead inspiration comprises three quarters of the process through research, problem reframing and synthesis towards defining requirements. The solution selecting component, comprising one quarter of the process for Beckman and Barry (2007), includes ideation, prototyping and implementation. This focus could be partly due to these authors focusing more on the educational context than business or industry.

Some design thinking processes do not include the implementation phase at all (see Figure 2.2). For example, Dym et al.'s (2006) design thinking process does not include an implementation phase, instead focusing only on aspects of inspiration and ideation in their three phase model of observation, inquiry and learning. The final prototype is instead often an alternative closure point (for example, Holloway, 2009; Stanford University, 2010). The prototype serves as a communication tool and for requirement specifications to then move into production and implementation, which they view as outside of the process. This demonstrates a potential weak point within the design thinking value proposition where, despite its purported capability in developing innovation, design thinking may not provide the capability to implement it. While it could be argued other processes such as project management step in at this point, an end to end model is more attractive within a business or organisational context for innovation and problem solving.

Of all the models compared (see Figure 2.2), Fraser's (2009) is closest in replicating Brown's (2008). The sentiment underlying each of the three gears of business design; deep user understanding, concept visualisation and strategic business design; align with Brown's inspiration, ideation and implementation. Fraser (2009) describes business design as 'combining the essential three gears with a design mindset' (p.65). It is significant to note however that she defers from using the term design thinking anywhere in her work, despite having worked with Proctor and Gamble on their transformation toward being a design thinking led organisation, preferring instead to

use the concept 'business design ' (Fraser, 2012). It appears this may be a strategic choice to rename design thinking for the business world with a more palatable title.

In summary, there is general uniformity in the design thinking process, with variances being superficial in regard to the naming and number of stages rather than the process itself. It is the final aspect of implementation where greatest divergence occurs, where a number of processes do not include this stage. This demonstrates an imbalance in design thinking toward the 'fuzzy front end' (Sanders & Stappers, 2008) of the process striving to understand a problem and determine solutions rather than implement them. A focus that is in itself understandable when there is a need to ensure that the problem identified is the actual problem that requires addressing.

2.2.1.2 Equating design thinking to process and tools

Design thinking is often equated to a process with an associated toolkit. The purpose for this is to 'make the practices of designers accessible and meaningful to managers' (Johansson-Skoldberg et al., 2013, p.128) which has resulted into it at time being misrepresented or diluted in the literature. Nussbaum (2011) argues that organisations were enticed by design thinking through its packaging of creativity within a process format. For example, Liedtka (2011) describes design thinking as a 'systematic approach to problem solving' (p.5). Similarly Brown (2009) believes that while 'Design thinking is unlikely to become an exact science...there is an opportunity to transform it from a black art into a systematically applied management approach' (p.176).

In addition to this process view it is often considered as basic design skills, or the ability to use design tools, where, through observing users, producing prototypes, and moving through a structured linear design process (Garcia, 2012) one develops design capability. For example there are a significant number of processes and toolkits offered by leading consultants on their websites, as well as in the literature, for anyone interested in design thinking to access (for example Curedale, 2013; Fraser, 2012; IDEO, 2010; Liedtka & Ogilvie, 2011; Riverdale County School & IDEO, 2011; Stanford

University, 2010). As Sobel and Groeger (2012) note, while these toolkits make an effort to demystify the process into a set of instructions there is negligible empirical evidence that such guides, toolkits or workshops develop a high level of proficiency or quality outcomes in design thinking. This is outside the scope of the research in this thesis, however it warrants further investigation.

Presenting design thinking as a toolkit or systematic process provides a shallow viewpoint of design thinking focused on what the design led professional does through describing their methods and tools. For example Brown (2010) discusses IDEO's human centred design toolkit as 'a methodology organisations can use to undertake the design thinking process themselves' (p.34), reducing design thinking to process and tools. Similarly, Liedtka and Ogilvie (2011) provide a four step design process of What is?, What if?, What wows? and What works? with a set of tools for using design thinking in business. Liedtka and Ogilvie (2012) openly discusses the audience for the work is operating managers, stating 'Writing a design-thinking cookbook for them doesn't replace designers—it recognizes that these managers are flying blind without access to the richness of what design brings' (p.8). While the purpose is to simplify and make design thinking accessible to managers and business, and does distinguish designerly thinking as an overall mindset, it ultimately reduces design thinking to a 'cookbook' of process and tools. While Liedtka & Ogilvie (2011) advocate for a designer to lead the process they discuss the designer's methods out of context as tools ready for use, and in doing so neglect the need for the knowledge and skill those tools require to use them (Johansson-Skoldberg et al., 2013, p.131).

Presenting design thinking as a process or toolkit leads organisations to consider and use design thinking in this one particular way without necessarily understanding the nuances of how to apply design thinking in practice. As a result, when business has attempted to integrate what it perceives as a process and tools into an organisation without understanding the need for a cultural and organisational change, or a paradigm shift, they have had little success with design thinking (Collins, 2013;

Nussbaum, 2011). Nussbaum (2011) speculated the reason for this lack of success is that as organisations attempt to integrate design thinking into their systems they turn it into a linear methodology that delivers ‘at best, incremental change and innovation’ (para. 4).

In summary, while the literature espouses design thinking as a systematic approach with an associated process and tools, there is limited insight into how to move between stages in the process; why tools are applied within each stage. There is also limited insight into how to contextualise the approach other than to describe it as ‘messy’ (Kimbell, 2009) or ‘chaotic’ (Brown, 2008, p.4). For example Brown (2008) described several methods such as brainstorming, prototyping and visual thinking to use throughout the process, yet does not provide insight into which methods should be used and when and how they should be adapted to each situation (Badke-Schaub, Roozenburg, & Cardoso, 2010, p.42). This focus on process and tools lends design thinking to being just another process for innovation and the business ‘flavour of the month’ (Cooper et al., 2009, p.50) rather than contributing to design or business research. Instead, seeking to understand and explain why design led professionals do certain things and identifying their thinking processes, which are not immediately available for researchers to access (Kimbell, 2012), would provide greater insight into how design thinking is enacted in practice.

2.2.2 The design led professional

This section discusses various aspects of the design led professional and their impact on design thinking in practice. As Porcini (2009) states: ‘It is not enough to hire a designer to get the right design solution. You need to engage the right designer’ (p.11) as each will apply a design thinking approach based on their level of capability. The design led professional then, either working individually or as part of a team, has significant impact on how design thinking is applied. First, mindsets of the design led professional will be explored. Second, will be a discussion on the characteristics of the

design led professional. Third, the roles of facilitator and design lead the design led professional enacts when leading design thinking initiatives are presented. Finally, this section concludes with discussing if design thinking requires the mindset of a design led professional or can be applied by any professional (see also 2.1.2).

2.2.2.1 Mindsets of the design led professional

The mindset of the design led professional, also referred to as stance, sensibilities or attitude, is discussed in only some of the literature and is presented generally with limited insight into how it is developed (see Boland & Collopy, 2004; Fraser, 2007, 2012; Fulton Suri & Hendrix, 2010; Martin, 2009; Stanford University, 2010). This 'mindset' is presented as underpinning how the design led professional approaches design thinking. For example, Stanford University's (2010) Design School Bootcamp Bootleg, an 'active toolkit to support...design thinking practice' (p.2) opens with a number of mindsets which are supported by the process and tools and are 'vital attitudes for the design thinker to hold' (p.2). These mindsets include: show don't tell, focus on human values, craft clarity, embrace experimentation, be mindful of process, a bias toward action and radical collaboration (Stanford University, 2010). These are however stated with no further information. These mindsets align with characteristics of the design led professional discussed further in 2.2.2.2.

Further, Fraser (2007; 2012), in discussing business design, highlights that starting with the right 'design mindset' works in conjunction with applying appropriate process and methods to create successful design solutions. She highlights the criticality of this, stating that the mindset of both the individual and team are the 'make or break' ingredient in design thinking. She does not however provide further discussion regarding what this mindset comprises or how to apply it. This is further validated by Carlgren (2013) in her doctoral research, who found that mindset holds a central place in design thinking where many expressed a desire to develop a different mindset as a result of experiencing design thinking.

While these design mindsets are highlighted as being core to design thinking and in turn the design led professional as the person who needs to apply them, there is limited information as to how they are developed or how to practice or apply them. This information was noticeably absent from Stanford University (2010), Fraser's (2007, 2012) and Carlgren's (2013) work. Fulton Suri and Hendrix (2010) broached how these design mindsets might be attained at a very general level, indicating they are 'learnable - although it takes encouragement, respect and discipline to fully develop them' (p.63). Similarly Porcini (2009) indicates these mindsets are mostly a natural attitude, however a natural attitude that can be directed with training so that design led professionals can be more conscious of their mindset and leverage it to its full potential. Porcini (2009) further states that 'Design thinking is like a sport—some people have natural talent, but with appropriate coaching, anyone can improve his ability' (p.16). Yet Porcini does not provide any indication as to what this 'appropriate coaching' might entail. As a result there is an apparent gap in the literature where the importance of design mindsets are extolled yet little is known about how the design led professional develops or applies these.

2.2.2.2 Characteristics of the design led professional

The literature demonstrates tension in its presentation of the characteristics of design thinking. While commonalities exist there is also variation, and confusion in ascribing characteristics to design thinking as an approach or to ascribing characteristics to the design led professional. Understanding these characteristics provides a richer understanding of design thinking and gives insight into how design thinking might be applied in practice. While some characteristics are based on empirical findings (see Cross, 2011; Rusk in Lockwood, 2009) most are opinions based on observations through personal experience (for example Brown, 2008; Dunne & Martin, 2006; Lockwood, 2009; Owen, 2007). These characteristics and how they are embodied or enacted are key aspects of design thinking in practice.

Through analysing and synthesising the literature eight core characteristics emerged (see Figure 2.5):

1. Optimism and comfort with ambiguity
2. Abductive thinking
3. Creative thinking
4. Systems thinking
5. Empathy and human centredness
6. Collaboration
7. Visualisation & prototyping
8. Iteration

These have been grouped according to Martin's (2009) three aspects of design thinking: cognitive, attitudinal and interpersonal. This provides a framework to understand the characteristics in relation to the design led professional. Cognitive aspects focus on the process of how designers think and attitudinal aspects on the designer's mindset. It is the interpersonal aspects that are becoming recognised as being part of design work as design expands to involve working within and across large multidisciplinary teams and users (Owen, 2007). In addition to these three aspects, design thinking in the literature is seemingly characterised by particular methods of working, which are not human attributes but related to methods. As a result, a fourth aspect that focuses on methods extends Martin's (2009) framework.

Characteristic	Aspect	Key concept	Key literature
Optimism	Attitudinal	The design thinker embraces the possibility of surprise, and is comfortable wading into complexity without knowing what is on the other side (Martin, 2009) and every problem is an opportunity to make something remarkable (Boland, 2004).	Baty, 2010; Brown, 2008, 2010; Boland, 2004; Boland, 2008; Conley, 2007; Cross, 2006; Dunne, 2006; Dym, 2006; Fraser, 2012; Jenkins, 2008; Kimbell, 2009; Martin, 2009; Owen, 2007; Terrey, 2010
Abductive thinking	Cognitive	Rather than inductive and deductive logic of what is or should be, abductive logic is what might be (Dunne, 2006). Integrative thinking combines the three.	Cross, 2006; Cross, 2011; Dunne, 2006; Fraser, 2009; Garcia, 2012; Grefe, 2011; Louridas, 1999; Martin, 2009
Systems thinking	Cognitive	Systems thinking understands that every problem is embedded within a larger system of problems and so a holistic view of the situation is required (Buchanan, 2001)	Brown, 2008; Blyth, 2011; Buchanan, 2001; Cross, 2011; Dunne, 2006; Dym, 2006; Fraser, 2009; Georges, 2003; Owen, 2007
Creative thinking	Cognitive	Creative thinking for designers is primarily concerned with invention and creating solutions according to constraints (Owen, 2007)	Brown, 2008; Blyth, 2011; Boland, 2004; Cross, 2006; Dunne, 2006; Fraser, 2009; Johansson-Skoldberg, 2013; Liedtka, 2011; Martin, 2009; Owen, 2007; Rusk in Lockwood, 2009
Empathy and human centredness	Interpersonal	Empathy & human centredness focuses on developing a deep understanding users and their needs {Dunne, 2006 #1701}	Beckman, 2007; Bell, 2008; Brown, 2008, 2010; Blyth, 2011; Carr, 2010; Cooper, 2009; Dunne, 2006; Fraser, 2012; Kimbell, 2011; Liedtka, 2011; Liedtka, 2013; Lockwood, 2009; Owen, 2007; Terrey, 2010
Collaboration	Interpersonal	Collaboration refers to working both with users and also forming multidisciplinary teams to design solutions (Lockwood, 2009)	Brown, 2008; Blyth, 2011; Dunne, 2006; Dym, 2006; Fraser, 2009; Georges & Romme, 2003; Grefe, 2011; Kimbell, 2011; Lockwood, 2009; Owen, 2007; Terrey, 2010
Visualisation and prototyping	Methods	Through visualising ideas and prototyping concepts in a range of media designers bring a common view to concepts for discussion, development and iteration (Owen, 2007)	Boland, 2004; Brown, 2010; Carr, 2010; Cross, 2006; Dunne, 2006; Fraser, 2009; Inns, 2013; Kimbell, 2011; Liedtka & Ogilvie, 2011; Liedtka, 2013; Lockwood, 2009; Owen, 2007; Rusk in Lockwood, 2009; Terrey, 2010.
Iteration	Methods	Design is an iterative process that moves from generating insights about end users, to idea generation and testing, to implementation (Kimbell, 2011)	Blyth, 2011; Dunne, 2006; Fraser, 2009; Kimbell, 2011; Liedtka, 2011

Figure 2.3: Characteristics of design thinking in literature

These characteristics of design thinking are a diverse collection that individually could belong to a range of disciplines or ways of working. As such, any type of professional, business consultant or designer can use each of these characteristics alike (Collins, 2013). It is when these characteristics are classed together they comprise the core cognitive, affective, interpersonal (Dunne & Martin, 2006) and method aspects of design thinking. Of note, regardless of the design thinking discourse, as a cognitive

style, a general theory of design or as an organisational resource, it is only the interpersonal characteristics that differ, not the attitudinal or cognitive characteristics. The interpersonal characteristics are advocated only by authors more aligned with the perspective of design as an organisational resource (see Figure 2.5). The acknowledgement of interpersonal characteristics indicates a shift in this latter perspective toward a more empathic and participatory approach to design.

Overall, characteristics are presented as describing design thinking as an approach or, interchangeably, as attributes of the design led professional. When considered an attribute of the design led professional characteristics are often referred to as mindsets (Stanford University, 2010), attitudes (Boland & Collopy, 2004; Kimbell, 2009) or expertise (Conley, 2007), which are inherently human rather than being seen as something associated with a discipline (also see 2.2.2.1). This highlights the challenge of differentiating the approach from the person.

Further, when considering design thinking as an organisational resource, all facets of the design led professional (see Figure 2.5) are needed - their mindset, as well as their skills and expertise. Baty (2010) argues that the depth and extent to which these characteristics reside in the design led professional also form a critical factor in the success or failure of a project where they need to be able to enact all of these aspects in sufficient depth. This also has implications for how the design led professional enacts design thinking in practice, including the roles they embody. These aspects are investigated within the research in this thesis.

2.2.2.3 Roles of the design led professional

It is recognised that over time as design has grown in scope and complexity so has the role of the design led professional (Kimbell, 2011). Within user centred design the design led professional was privileged in the role of 'expert' (Sanders & Stappers, 2008, p.10-11). Since the emergence of participatory design the role of the design led professional has increasingly required facilitating diverse groups of people for the

purpose of solving problems. Meroni and Sangiorgi (2011) takes this a step further to discuss multidisciplinary design processes, where the design led professional forges connections among people and organisations, bringing users to the centre of each project and defining the platforms and tools needed to enable and encourage participation (Cottam and Leadbeater, 2004 in Mattelmäki & Sleeswijk Visser, 2011). The role of the design led professional then increasingly acts as a cultural intermediary (Julier 2008) or as the mediator in multidisciplinary teams rather than 'makers of forms' (Kimbell, 2011, p. 287).

In regard to design thinking specifically, the literature offers little insight into how the design led professional designs or executes design thinking in a project context. The literature instead generally focuses on the design process and describes how the solution progresses throughout the project. As a result there is limited discussion and understanding of how the design led professional designs and applies design thinking in practice and the roles they enact to achieve this. Two roles however did emerge within the literature of design facilitator and design lead (see Beckman & Barry, 2007; Body, Terrey, & Tergas, 2010; Buchanan, 1992; Golsby-Smith, 2007; Sanders & Stappers, 2008). These roles were however discussed largely implicitly. Understanding the roles the design led professional enacts when applying design thinking within a project provides insight into the complexities of the approach and the range of capabilities required.

Design facilitator

The role of design facilitator is to coordinate and navigate a team through the design thinking process. Body, Terrey and Tergas (2010) describe three attributes of a successful design facilitator as having: a strategic perspective, a human perspective and a design perspective. They state: 'The role of the design facilitator is not suited to someone who wants high levels of predictability and order. The design facilitator needs skills not only in facilitation but also in leadership, strategy and change management that will allow the design facilitator to navigate when reality strikes' (p.65, 68). Body, Terrey and Tergas (2010) further argue the key challenge is reading

the group and the design challenge simultaneously to determine what is needed. Similarly Golsby-Smith (2007) emphasises the need for skillful facilitation of the process, where the facilitator is trained in the art of design rather than group dynamics. As Golsby-Smith (2007) states: 'They (the design facilitator) bring the design skills and methodology; the group brings the design problem' (p.29). While design facilitators do not need expertise in the specific problem details or content, they do need to be able to coordinate multidisciplinary experts through a design process to navigate a team of people through the complexity of a problem or project (Inns, 2013).

Further, Owen (2007) expresses design thinking as generalist in preparation and execution stating: 'In a world of specialists, there is real need for those who can bring diverse experts together in coordinated effort' (p.24). In this way, designers are positioned as playing a key role in mediating and negotiating between the concerns of various stakeholders in a project (Beckman & Barry, 2007; Blyth & Kimbell, 2011). Beckman and Barry (2007) explicitly acknowledge the impact of the design facilitator, noting within their research that teams who had a member with the knowledge and experience to be able to move the team through the design thinking and innovation process outperformed others. Design facilitation then is a core skill of the design led professional and a required role within a design thinking project in order to navigate a team through the design process to achieve a successful design outcome.

While the role of the design facilitator is acknowledged by these authors this role is discussed in general terms. The discussion provides an indication of the purpose of the role and the required skills, knowledge and characteristics of the design facilitator yet with limited insight into how it is enacted in practice.

Design lead

The second role highlighted in the literature of design lead overlaps with the role of design facilitator. Where design facilitation focuses on navigating teams through the process, the role of design lead focuses on providing design expertise throughout the process. Design expertise goes further than technical design skill but also the ability to

consider and integrate the diverse ideas and thinking of a multidisciplinary team into concepts and solutions that address the scope and complexity of the design problem (Beckman & Barry, 2007; Sanders & Stappers, 2008). Buchanan (1992) views the role of the designer within complex design projects as that of 'master of exploration' where the designer is expert in the process, while acknowledging that all participants require an understanding and awareness of the process. Sanders and Stappers (2008) writing within the co-design literature highlights this also, acknowledging users as 'experts of their experiences' (p.12) but also stresses the need for leadership and intervention from the designer to give participants the appropriate tools to express themselves in a manner which contributes value to a design outcome. Brown (2008) agrees, arguing that design professionals in particular can push solutions beyond expectations due to their expertise in design. This includes more than facilitating the process but also leading, guiding, and providing scaffolding for people, depending on their creative confidence and capability (Sanders & Stappers, 2008). Conversely, Kimbell (2011) believes the designer is over privileged as the main agent in designing. However the demonstrated literature provides reasoning for the need of design expertise and leadership to achieve successful design outcomes.

Similar to the discussion on the role of design facilitator, the available literature does little to highlight how the role of design lead is enacted in design thinking practice. Instead it simply provides an overview of the role. In order to have a more in depth understanding of design thinking in practice, further understanding of the design led professional and the roles they embody in applying design thinking would be beneficial. This research project aims to provide more empirical detail and expand on the limited literature available.

2.2.2.4 Who can apply design thinking?

A final tension in the literature exists surrounding who can apply design thinking. While design thinking is acknowledged as part of the expertise and skill of the professional designer it is also discussed that it can be applied by a diverse range of professionals. Brown (2009) states: 'Design thinking begins with skills designers have

learned over many decades in their quest to match human needs with available technical resources within practical constraints of business' (p.4). In this he acknowledges the professional designer yet then contradicts himself stating 'I now use it [design thinking] as a way of describing a set of principles that can be applied by diverse people to a wide range of problems' (Brown, 2009, p.7). Similarly, Lockwood (2009) believes that design thinking is no substitute for professional design or designing yet is generally associated with applying a designer's sensibility and methods to problem solving, no matter what the problem. Through this both authors disempower the professional designer into the more generic group of 'diverse people'. This is reminiscent of Simon (1969), Buchanan (1992) and Owen's (2007) arguments of design as a general theory of design that can be conducted by any professional (see 2.1.2).

Further to this Liedtka and Ogilvie (2011) advocate that design thinking is a trainable skill stating that 'design thinking can be taught to managers' (p.5) which provides the foundation for their collaboratively developed *Designing for Growth* toolkit. Grefe (2011) takes the middle road in this argument agreeing that design thinking does not require a designer or to be led by a designer yet those 'trained and experienced in design do have a special affinity toward the process and its successful application' (p.30). This demonstrates the various scales at which design thinking is perceived. It can be considered a holistic set of skills and expertise that have been developed over a substantial time period; or a trainable skill or set of principles that, it is implied, requires little training or development.

This section has further indicated attributes of the design led professional of mindset and characteristics which contribute to the dimensions in which design thinking is understood. This has implications for how individuals and organisations view and apply design thinking in practice. It raises questions as to the value of formal design training in order to lead and apply design thinking in practice. While the literature indicates those with a design background may lead the approach to better quality outcomes,

this requires further investigation. Understanding the level of capability required by an individual to apply design thinking with quality outcomes would also be beneficial. The research in this thesis contributes to the conversation regarding the capability requirements of the design led professional.

2.2.3 The impact of the environment

The third component evident in the literature that influences design thinking in practice is the environment in which it is executed. This occurs at the organisational and project level.

The culture of the organisation

In particular the culture of an organisation impacts on how design thinking is valued and applied. Martin (2009) and Nussbaum (in Collins, 2013) both introduce that long standing cultures in many corporate organisations naturally constrain design. They further argue that organisations require particular conditions to ensure the success of design thinking. One of the most significant barriers identified is a low tolerance of risk and failure, where failure is not viewed as a source of learning or opportunity (Brown & Wyatt, 2010). Other barriers apparent in the literature which may inhibit acceptance and integration is a resistance to taking a human centred approach; constraints of time; a failure to balance the perspectives of users, technology and the organisation; or at the integration level that the approach is not embraced by the whole organisation (Brown & Wyatt, 2010; Martin, 2009). Jenkins (2008) highlights from his experience that organisational sponsors are often unaware integrating design thinking requires an entire cultural transformation and as a result most organisations are not prepared for this.

In line with the design led professional, an organisation needs to demonstrate mindsets and characteristics of design thinking for it to be used to its maximum potential or integrated into work practices (see 2.2.2.1 and 2.2.2.2). For example, Boland, Collopy, Lyytinen and Yoo (2008) discuss the need for leadership to adopt a

design attitude to begin the transformation of leadership, and in turn the organisation. Further Brown (2009) and Sobel and Groeger (2013) discuss the need for attitudes and characteristics of open-mindedness, experimentation, a climate of optimism and acceptance of risk for design thinking flourish and take hold within the culture. Neither however contribute advice on how to do this. Jenkins (2008) provides some insight discussing the need to maximise 'opportunities for human interactions, communication, and connection, and breaking down the formal structures and silos that keep people apart' if organisations want to create 'design friendly cultural environments' (p.22). As an example from a practical perspective Preston (in Boland & Collopy, 2004) discusses creating a design culture in the Australian Tax office to integrate design thinking and develop core design competencies in staff. To do so the organisation introduced a number of initiatives including conferences, skill development programs, how to guides and an emphasis on supporting and valuing collaboration (Preston in Boland & Collopy, 2004). While the types of initiatives highlighted provide some perspective on methods, these primarily relate to capability development and it remains unclear how successful the program was at altering the organisational culture.

From this it can be determined the cultural organisational environment within which design thinking is conducted can have significant impact on its adoption and success, as a single project or integrating it across an organisation. There are a significant number of possible cultural barriers of which just a small number have been identified in the literature.

The project environment

At a lower level to an organisation's culture as whole, there is also limited discussion in the literature of the impact of the environment within a project itself on design thinking initiatives including how it is created throughout a project and how it influences the process, progress and outcomes. Developing a creative environment for the project is occasionally implied, for example Holloway (2009) discusses the use of 'project war rooms' (p.51) to work in and a space to visually put up and store work. Further, Body (2008) mentions that in integrating design thinking at the Australian

Taxation Office physical design spaces were set up, and Fraser (2012) states the importance of creating spaces conducive to creative collaboration. Understanding the role of the environment both at the organisational and project level in more depth would be beneficial for organisations and practitioners to understand how the environment impacts on design thinking in practice and outcomes..

Summary

This section has presented an overview of key aspects of design thinking in practice. It indicates design thinking in practice often comprises more than a process and toolkits as purported by much of the literature. As Badke-Schaub, Roozenburg & Cardoso (2010) state design thinking 'is a complex behavior within a complex context' (p.45-46). Three elements of this were identified of: design thinking process and methods, the design led professional and the environment in which design thinking is conducted.

Several weaknesses in regard to these elements in understanding design thinking in practice were identified. First, the literature presents design thinking as primarily focusing on process for the purpose of being accessible beyond design, particularly within business (for example Fraser, 2012; Liedtka & Ogilvie, 2011; Martin 2009). This simplification in its representation potentially contributes to a limited understanding of the reality of the complexity of applying design thinking in practice. Second, characteristics of design thinking are indistinguishable from the characteristics of the design led professional which raises questions regarding the differentiation of design thinking as an approach compared to individual characteristics. Thirdly, little is empirically understood about the roles the design led professional enacts in practice. While two roles of design facilitator and design lead have been identified, only an overview of these is provided in literature with limited insight into their practical application (see Body, Terrey & Tergas, 2010; Golsby-Smith, 2007; Jenkins, 2008). Finally, there is limited understanding of the impact of the environment on design thinking in practice. While there is some discussion on the role of organisational

culture, discourse of the project level environment has only vague references in the literature (for example Body, 2008; Fraser, 2012; Holloway, 2009). These latter two aspects of the design led professional and the impact of the environment on design outcomes remain significantly under explored within the literature.

While these three components of design thinking in practice of the approach, the design led professional and the environment in which it is conducted were identified within the literature they are never explicitly discussed together. Exploring these aspects further and their interdependent relationship forms the basis for the research within this thesis.

2.3 Chapter summary

This chapter has reviewed the foundations and perspectives of design thinking, and elements of design thinking in practice. As the interest in design thinking has grown and diffused across a range of domains and disciplines over time it has diverged into a number of discourses. This is particularly evident within the perspective of design thinking as an organisational resource where the majority of the literature is semi academic or practitioner led, and often based on opinion or experience. There is limited empirical research from which to draw a critical understanding of design thinking as a concept or how it is applied in practice. Little consensus on a definition of design thinking exists, instead conflicting interpretations and wide ranging descriptions exist. It is portrayed as a panacea for innovation; as a complementary strategy; or as one of many approaches to solving problems. In addition, it is evident there is a limited grasp on how design thinking is applied in practice and what the challenges and opportunities are to develop it. Further, in applying design thinking, the interplay between elements of the project approach, design led professional and environment remains unknown.

Overall, it is evident from the literature that design thinking is portrayed idealistically, simplistically and generally. The limitations within the literature provide a framework for the research within this thesis. The central aim of this thesis is to investigate design thinking within the context of large organisations. In particular it seeks to understand how the design led professional understands and enacts design thinking in practice. It aims to contribute to the literature through developing an empirical understanding of the concept of design thinking from an academic and practitioner perspective. It further seeks to demonstrate the constituent elements that comprise design thinking in practice and their interrelationship to achieve quality outcomes. The research methodology for this research will be explored in the following chapter.

3 Research methodology

3.0 Introduction

This chapter presents the qualitative approach and design of this research project. This thesis addresses the research question: How does the design led professional understand and enact design thinking in practice?

The framing of this research question forms a logical sequence. First I investigate how the design led professional understands the concept of design thinking, as this informs their practice. Second, the constituent elements of design thinking in practice can be framed through exploring how design led professionals enact design thinking within a project, including their mindsets, knowledge sets and skill sets. This question is then considered within the context of working with large organisations- considered to be any business who employs 200 or more people (Australian Bureau of Statistics, 2002).

This chapter will commence with discussing the pragmatic orientation for this research project followed by the methodological frameworks of case study and ethnography, which inform the research design. The research design is then outlined, including a discussion of the qualitative data collection methods used across the three studies of semi structured interviews, participant observation and artefact analysis. The use of the constant comparative method from constructivist grounded theory for data analysis and synthesis are then presented. This is followed by the research trustworthiness and quality considerations for this research project.

3.1 Research framework

This section details the stance and methodology underpinning this research project. First I discuss the pragmatic approach, which underlies the mixed methods approach

employed. Second case study methodology will be introduced. Finally ethnographic methods utilised will be outlined.

3.1.1 A pragmatist approach to research

There are multiple versions and interpretations of pragmatism. Each has varying emphases from philosophically informed versions to everyday understandings, where pragmatism equates to a kind of common sense (Cherryholmes, 1992; Melles, 2008). Pragmatism aligns well with the action oriented envisioning of futures that characterise work in design and the wicked problem formulation (Melles, 2008). The classical pragmatist tradition commenced in the early twentieth century, with three major proponents being Charles Peirce, William James and John Dewey. In the pragmatist view, priority was given to the ways in which humans use and experience things rather than the ways in which they know them (Sundin & Johannisson, 2005). Emphasis was placed on the relationships between belief, knowledge and actions where truth and meaning of ideas was derived from their practical usefulness within real world contexts (Cherryholmes, 1994; Hannes & Lockwood, 2011; Melles, 2008). As noted above in the work of Romme (2003) the design approach of organisations is fundamentally a pragmatic approach, favoring action oriented intervention. As Sundin and Johannisson (2005) state 'Judging the truth of an idea becomes a question of whether the idea makes any difference to practice or not, whether the idea provides us with a useful tool or not' (p.24).

In the latter half of the twentieth century, Richard Rorty developed 'new pragmatism', also referred to as neo-pragmatism. This concept draws from and builds upon classical pragmatism but focuses instead on language, often referred to as the 'linguistic turn' (Sundin & Johannisson, 2005). In this shift, rather than concentrating on individual experiences, the emphasis is on the communication of these experiences through language (Sundin & Johannisson, 2005). In this way 'language and knowledge represent nothing in themselves, but are seen as tools through which people deal with

their worlds' (Sundin & Johannisson, 2005, p.24). This view of language and knowledge as tools focuses not just on using these as part of a process but also the outcome they facilitate. It is this neo-pragmatist view in particular that underpins this research project due to its focus on language which is critical for considering how participants understand and articulate their knowledge of design thinking.

Pragmatism favours mixed methods. This is because it falls outside of the two dominant research paradigms - the positivist scientific notion of a singular reality and the constructivist humanities notion that there is no single objective reality (Feilzer, 2010; Morgan, 2007). Instead, pragmatism offers an alternate worldview where pragmatists are 'anti-dualists' (Rorty, 1999, p. ix). Rather than be concerned with the philosophical debates regarding the constructions of reality pragmatism is instead more interested with practical problem solving in the 'real world' (Feilzer, 2010, p.8). It is most concerned with the problem, seeking to clarify meanings and investigating anticipated consequences of the research (Cherryholmes, 1992; Feilzer, 2010). Therefore, pragmatism's goal is not an accurate representation of reality and instead argues for 'utility' (Rorty, 1999, p. xxvi). This utility refers to a reflexive research practice which asks questions such as 'what is the research for?' and 'who is the research for?' to ensure purpose is never forgotten (Feilzer 2010; Morgan, 2007).

Morgan (2007) attempts to depict the false and often forced dichotomies between qualitative and quantitative research methods, recognising that research is rarely an either/or situation but often a combination of both (see Figure 3.1). This combination is presented as a pragmatic approach to research where Morgan (2007) depicts abduction, intersubjectivity, and transferability, as alternatives to the traditional dualism extremes. Although Figure 3.1 captures some of the distinctions between qualitative, quantitative and pragmatic approaches, this could be construed as overly simplistic in its representations. It however provides a purposeful viewpoint to discuss the place of pragmatism in relation to the qualitative and quantitative dualisms and how pragmatism informs this research.

	Qualitative approach	Quantitative approach	Pragmatic approach
Connection of theory and data	Induction	Deduction	Abduction
Relationship to research process	Subjectivity	Objectivity	Intersubjectivity
Inference from data	Context	Generality	Transferability

Figure 3.1: A pragmatic alternative to the key issues in social science research methodology (Morgan, 2007, p.71)

First, a pragmatic approach uses abductive reasoning, along with deductive and inductive logic, as its connection between theory and data. Where deductive and inductive logic focus respectively on what should be or what is, abductive reasoning focuses on what might be (Dunne & Martin, 2006); this is of course a line of reasoning linked to design thinking. Morgan’s (2007) perspective on abduction involves moving back and forth between induction and deduction; converting observations into theories or hypotheses and then assessing these through action. Abduction as applied within this research project refers to making temporary conclusions in line with a constant comparative analysis approach (see 3.2.4) and then further testing these with new situations in an iterative fashion.

Second, pragmatism recognises research as rarely completely objective or completely subjective. Instead a pragmatic approach emphasises an intersubjective approach. This highlights the social and communal dimensions of experience, language and inquiry (Bernstein, 1992), where each individual has their ‘own unique interpretations of that world’ (Morgan, 2007, p.72). The researcher then works back and forth between objective and subjective interpretations, which provide varying perspectives from which to understand the phenomena (Morgan, 2007). In light of this, reality or truth refers to whatever interpretation of events is the one that is most useful or workable in a particular situation. Truth is not objective and transcendent but instead defined as ‘local and utilitarian’ (Hansen, 2006, p.294). Intersubjectivity within this research project is focused on interpreting the local, situated and social processes of applying

design thinking in practice from a variety of individual perspectives across organisations and geography. This attention to intersubjectivity is demonstrated within findings across all three studies (see Chapters 5 and 6).

The final dualism pragmatism transcends is the distinction between knowledge that is either generalised or contextual. Generalised knowledge is often associated with quantitative and statistical findings. Specific and context dependent knowledge is more often associated with qualitative research. However it cannot be assumed that the research approach or methods make results either context-based or generalisable (Morgan, 2007). In considering this, pragmatism focuses on transferability; the extent to which the knowledge and lessons learned from one setting can be appropriated and used in another (Morgan, 2007). As Rorty (1991) states:

For us [pragmatists], all objects are always already contextualized...there is no question of taking an object out of its old context and examining it, all by itself, to see what new context might suit it...Once one drops the traditional opposition between context and the thing contextualized, there is no way to divide things up into those which are what they are independent of context and those which are context-dependent (pp.97-98).

Reaching transferable principles relies upon a moving back and forth between specific results and more general implications to understand what may be transferable to other settings. Within the context of this research, the goal is to understand and identify transferable principles within findings that are applicable to other organisational environments (see 3.3).

3.1.2 The relationship between pragmatism and design

A number of design disciplines, such as urban planning, architecture and interaction design, already have ties with pragmatism due to its 'treatment of truth, action, values and the theory-practice divide' (Melles, 2008, p.88). Further, pragmatism is evident in seminal works relevant to design and design thinking including Rittel and Webber's

(1973) concept of wicked problems and in more recent works as a conceptual scaffold for design thinking (Dalsgard, 2014). Melles (2008) specifically argues for Rorty's neo-pragmatism, rather than classical pragmatism, to underpin design research as it reinforces conventional pragmatist ideas, but extends them to consider the value in the combination of the sciences and the humanities where each have 'equal claims to truth, meaning, and representation' (p.88). The language focus within neo-pragmatism, as well as its appreciation for both science and humanities, is fitting as the use of co-design approaches continues to increase within the design domain to deal with complex and wicked problems. This aligns with notions of design thinking as 'the third way', which balances science and humanities thinking (see 2.1.3.3). Due to the existing relationship and alignment of design with pragmatism and neo-pragmatism (Georges & Romme, 2003) it was determined that a pragmatic approach would be appropriate to inform this research in design thinking in practice.

In this section the foundations of pragmatism and the development of neo-pragmatism have been presented. Further, the relationship of pragmatism to this research project has been established, where pragmatism transcends traditional dualisms to consider abduction, intersubjectivity and transferability within its approach. Finally, the relationship between pragmatism and design was discussed as a justification for its use within this thesis. In the following section the case study methodology, which informs the research in this thesis, will be discussed.

3.1.3 Case study methodology

This qualitative research project is informed by case study methodology. Case study methodology is defined by Eisenhardt (2007) as 'a research strategy that focuses on understanding the dynamics present within single settings' (p.534) and is most commonly used in the social sciences. This research project includes two organisational case studies, the organisations being Second Road and Deloitte Australia, and one interview study (these are detailed further in Chapter 4). Within this

research, case study methodology informs the scope whereby a case study is an empirical enquiry that 'investigates a contemporary phenomenon in depth and within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident' (Yin, 2009, p. 18). The boundaries define the case study (Stake, 1978). The case study need not be a person or an organisation but whatever 'bounded system' is of interest. What occurs within the boundaries of 'what is the case' is therefore considered vital as contrasted with other study types where hypotheses or issues usually determine study content (Stake, 1978; Stoecker, 1991). Within this research the boundaries of 'what is the case' are explicitly related to the phenomenon of exploring the notion of design thinking in practice. All other aspects of organisational life beyond this fall outside the scope of this research.

Case study research is often criticised for its lack of generalisability and lack of rigour (Yin, 2009). As such it is often considered weaker than quantitative methodologies for theory, reliability and validity (Stake, 1978). Flyvberg (2006) discusses that case study research has its own rigour, different to scientific research with quantitative methods, but no less strict. Some of the criticisms of case study research and strategies for limiting these within this project are outlined next.

3.1.3.1 Potential for bias and weak construct validity

Case study research has been criticised for its potential for bias and weak construct validity. To mitigate this multiple sources of evidence are used in and across studies to provide multiple perspectives on the phenomena (Miles & Huberman, 1984). From a holistic perspective multiple studies are used within this research for the same purpose. The convergence of information from a variety of sources and sites provides several measures of the same phenomenon (Yin, 1994) and provides stronger substantiation of constructs (Eisenhardt, 2007; Leonard Barton, 1990).

3.1.3.2 Low internal validity

Another criticism of case study research is its low internal validity caused by making inferences of causal explanations due to not directly observing all events (Runyan, 1982). This research project uses multiple data collection techniques for method triangulation and multiple studies to aid internal validity (Eisenhardt, 2007). As each method has varying validity threats, data produced by different data collection methods are compared to provide a basis for checking interpretations (Hammersley & Atkinson, 2007). It is less about checking data validity as much as drawing inferences about which data seems to be more likely to be valid (Hammersley & Atkinson, 2007).

3.1.3.3 Lack of measures for external validity

Due to the difficulties of generalising findings, case study research is sometimes criticised for its lack of measures for external validity (Stoecker, 1991). Multiple studies have been used (Leonard-Barton, 1990) to increase the external validity as a single case study limits generalisability. This multiple case design allows for within study analysis as well as cross study comparison of design thinking in practice in diverse settings (Darke, Shanks, & Broadbent, 1998). However, as discussed previously (see 3.1.1), in line with a pragmatist approach, this project recognises that while findings may not be generalisable to a wide population, learnings and principles from these context-specific studies may reflect and be transferable to other settings. Therefore, the project will be evaluated using principles of transferability rather than generalisability.

3.1.3.4 Poor rigour in data analysis

Synthesis and analysis of qualitative data is often intensive and laborious (Cavaye, 1996; Darke et al., 1998). As case study research often includes large data sets it is often criticised for its poor rigour in data analysis (Yin, 2003). There is limited literature available to guide the process of analysis of case data (Eisenhardt, 2007), which often results in thin descriptions and disconnected concepts (Charmaz, 2006). To enhance the rigour of analysis and findings constructivist grounded theory will be used for data analysis, which is detailed later in the chapter (see 3.2.3).

3.1.3.5 Data collection is highly subjective

Within case study research, data collection is highly subjective influenced by researcher experience and skills which limits validity (Galliers, 1992). To assist in mitigating this, researchers require certain skills and qualities such as: 'initiative, pragmatism, the ability to take advantage of unexpected opportunities, optimism and persistence in the face of difficulties and unexpected events' (Darke et al., 1998, p.287). Within this research project the researcher spent 15 days on site across three months in the field with the first case study organisation, Second Road. The purpose for this was two fold - in order to build familiarisation with the company to gain access for research purposes but also to gain experience in the field to build research skills to limit validity concerns.

Case study methodology informs this research project due to its focus on capturing and understanding a rich contextual picture of a phenomenon. It is suitable for the exploratory nature of the research aims and uses diverse data collection and analysis methods to achieve this (Darke et al., 1998). In particular it is considered to be useful for exploring the space between theory and practice and where research and theory are at their early formative stages (Benbasat, Goldstein & Mead, 1987; Breslin & Buchanan, 2008; Cavaye, 1996; Yin, 1994). Therefore it is appropriate for this research project as there is currently little empirical research on design thinking in practice. This

section has outlined the case study methodology that informs this research project. The next section discusses the ethnographic methods utilised within this case study framework.

3.1.4 Ethnographic methods

Ethnography is a social research methodology with a complex history, founded within anthropology. It has also been developed within case study and other sociological methods, and later within psychology and human geography (Hammersley & Atkinson, 2007). As a result, ethnography does not have a well defined meaning. Instead it is often described by way of its data collection methods and research outcomes. Despite the lack of a standard definition ethnographic work has defining features. In particular as an in depth qualitative study process, often small scale in nature, and as a study that examines only one or a few cases.

The ethnographic methods used in this research project included semi structured interviews, participant observation and artefact analysis across three studies. It is not unusual for case study research to draw upon ethnographic methods, although case studies may also draw upon quantitative methods. Ethnographic methods are committed to first hand observation and participation within a chosen everyday context, supported by documentary sources, in order to construct a coherent explanation of social action and implications within local contexts (Agar, 2004; Hammersley & Atkinson, 2007). Agar (1996) in his seminal work on ethnography states that data is 'actively constructed over time in a collaborative way' (p.4). Thus, data is actively generated and not passively collected. In ethnographic research it is the understanding of the context from diverse perspectives and then locating the phenomenon within that context that is interesting, rather than simply noticing only the phenomenon of interest and measuring it (Agar, 2004).

Due to the nature of case study research and subjectivity of ethnographic methods it is recognised that biases introduced by the researcher during the collection and analysis

of data may occur. Darke et al. (1998) discusses two types of biases in particular: 'the effects of the researcher on events and the behaviour of participants and the researcher's own values and prior assumptions which may prevent adequate investigation and consideration of data' (p.285). Due to the situated nature of data collection in this research project, especially in participant observation and semi structured interviews, effects arising from the researcher being on site are somewhat unavoidable. As Walsham (1996) discusses, simply by being on site and sharing concepts and interpretations with people the researcher is influencing what is happening. Hammersley and Atkinson (2007) acknowledge these limitations however argue that awareness of these limitations means that reactivity can be minimised and monitored.

Agar (2004) argues that 'understanding how the social world works is poorly served by traditional social research approaches' (p.17). He advocates for ethnographic research as through its iterative and recursive process it is attuned to complicated patterns, and the discovery of connections. Rogers and Bellotti (1997) agrees arguing that applying and adapting ethnographic methods encourages focused inquiry into how better to support particular work practices with improvements in work procedures and technology. As this study is focused on design thinking in practice within enterprise organisations such concepts of adaptiveness, iteration, recursiveness, patterns and emergence that exist within ethnographic methods also exist within the phenomena being studied. These alignments ensure ethnographic methods are a suitable fit for this research project.

In this section the methodological framework of a pragmatic approach, case study methodology and ethnographic methods for the research project have been discussed. Strengths and weaknesses of each have been identified and strategies for limiting weaknesses presented. The following section details the research strategy for the project including participant criteria and sampling, data collection methods and data analysis.

3.2 Research design

This section details the over arching research design for the project. It begins by providing an overview of studies within this project. Next it discusses the participant criteria and sampling strategies used. Data collection methods are then critically reviewed and their suitability to the project presented. Finally, the constant comparative method for data analysis is detailed along with considerations for ensuring research quality.

3.2.1 Overview of studies

This research investigation includes three studies, two organisational case studies and one interview study:

- A case study of consultancy Second Road and how they understand and enact design thinking in practice during client engagements. This study utilised methods of semi structured interviews and artefact analysis.
- A case study of professional services firm Deloitte Australia and how they are integrating design thinking into their culture and work practices. Data was collected using methods of participant observation, semi structured interviews and artefact analysis.
- An Expert Interview study with academics and practitioners across the globe who identify with and practice design thinking, to understand meanings and practices of design thinking comprising a set of semi structured interviews.

Data was collected over a 15 month period from November 2010 to January 2012 (see Figure 3.3). While the overall strategy and methods remain consistent across the three case studies, the procedures and number of methods within each vary according to the context (see Figure 3.4).

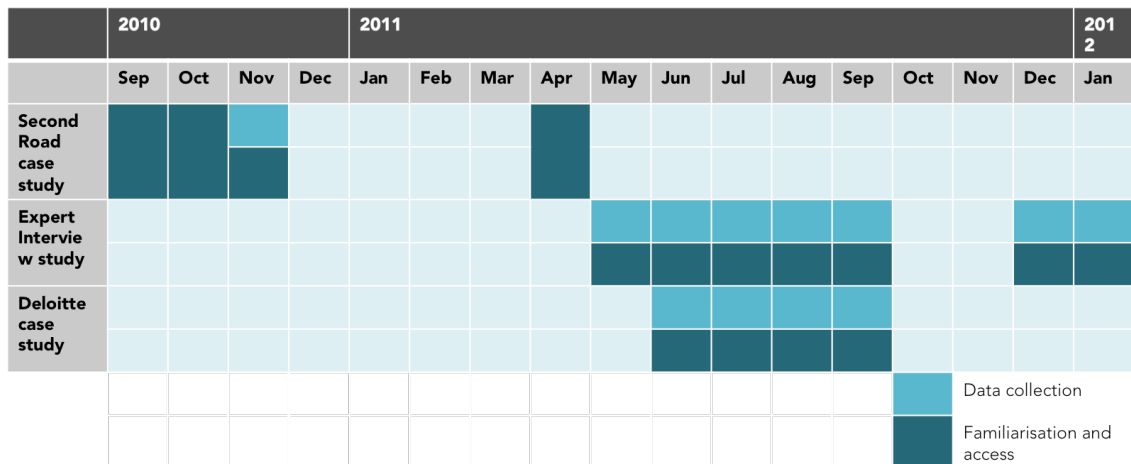


Figure 3.3: Data collection timeline

Study	Type of study	Data collection methods
Second Road	Case	Interviews Artefact analysis
Expert Interview	Interview	Interviews
Deloitte	Case	Interviews Participant observation Artefact analysis

Figure 3.4: Studies and data collection methods in this research project

This research project observed the phenomena over multiple settings and in so doing developed a broad perspective on design thinking in practice. The combination of three different studies, albeit linked by an underlying methodological and analytic commitment, requires some justification. First, Silverman (1998) has noted that often, organisational studies choose between quantitative and qualitative approaches, as if this divide is a meaningful and useful approach. Citing Suchman's (1987) study as an exemplar, Silverman (1998) claims that a more pragmatic and less ideological approach is proffered. Second, as Harden and Thomas (2005) also note in relation to systematic reviews, the combination of different methods in one study allows for a form of methodological triangulation. That is, different settings and data types can be juxtaposed to complement and expand on each other to produce a richer account than possible with a single method. This is also noted by Lambert and Loiselle (2008), who see such combinations as contributing to the iterative, grounded analysis of specific settings. Furthermore, this is also advantageous as it provides multiple lenses through

which to view the phenomenon and increases the opportunity for conclusions that are transferrable to other contexts and settings. Third, to some extent the theoretical reflections of researchers, working with mixed methods research, apply here (for example Johnson, Onwuegbuzie, & Turner, 2007; Tashakkori & Creswell, 2007). As already noted previously in the chapter (see 3.1.1), there is an underlying pragmatic approach driving the gathering of data with a view to understanding a phenomenon, so that ultimately some practical application might be better realised. Therefore, the aim was not merely to discover the 'truth' about design thinking but rather to understand how and where it is being applied and what clarity can be obtained by gathering accounts of practice in a range of settings.

3.2.2 Participant criteria and sampling

This section details the overall strategy for determining the suitability of participants and participant organisations for this research project. Participant sampling methods will also be discussed. As participant recruitment varied from across studies, these will be detailed within the research procedures for each study (see 4.1.3, 4.2.3 and 4.3.3).

First and foremost, in line with a pragmatist approach, participants and participant organisations were selected due to opportunity, accessibility and timing. It is well known in case study research that gaining access to organisations and appropriate participants can prove to be a difficult and time consuming challenge in the research process (Yin, 2009). Within this research project the researcher responded to the enthusiasm of the two field study organisations that indicated interest. In this way, this research project followed a similar experience to that of Okumus, Altinay and Roper (2007) who discusses that participants for their organisational research project were not selected by any rigorous procedures but the companies (or more specifically representatives of the companies) selected themselves. He states 'It is not always possible to systematically select companies and informants but the researcher is the one who is selected by organisations' (Okumus et al., 2007, p.13-14). Taking this into

account, participants and participant organisations were still required to fit within the scope of the research project using the following criteria:

- **Reputation:** This aspect was important to ensure the available data was credible and of high quality. Interview study participants all have respected local professional profiles in design thinking and related areas, and many have a global reputation for their work. Participant organisations also have global profiles within the design and/or innovation areas.
- **Positioning:** As this study is focused within organisational environments and the use of design thinking in practice it was considered important to choose participants and participant organisations that work within and understand these complexities. Participants and participant organisations all work within innovation, designing intangible products, systems and services.
- **Research fit:** Each participant and participant organisation was evaluated in terms of the potential to provide quality data. In particular, being able to fit within the constraints of the research question where design thinking in practice and large organisations co-existence was paramount. In addition, with participant organisations, and access to appropriate situations and participants was also considered.

Overall, this research project included in excess of 60 participants across the three studies. Participants included formally educated designers and design led professionals (those who may not have formal design education however fulfill design roles). Including participants from both of these categories in this research project was important as this is representative of the diverse range of people applying design thinking in practice.

Participant criteria influenced the sampling techniques across the research project. As a result a non-probability sampling approach was used as it was important to sample participants with sufficient experience in the phenomena being investigated (Henry, 1990). As the goal of this research project is to achieve transferability rather

than generalisability of its findings, non-probability sampling techniques of convenience sampling and snowball sampling were suitable. This is because it is not attempting to represent the population as a whole but instead identify principles and practices of transferable value to other contexts and settings. Convenience sampling and snowball sampling were used across the three studies.

Convenience sampling was the primary sampling method as participants needed to be from within the boundaries of the participating organisations and satisfy participant criteria. Convenience sampling played a major role in determining who the researcher could gain access to. Participants were selected for their availability and accessibility for the study as well as their experience with design thinking in practice (Henry, 1990). As much as possible this involved the selection of a representative sample in order to reduce the potential for bias (Henry, 1990). For the two case studies the goal was to include participants who represented all service lines and hierarchical levels across the two case organisations. In the interview study, the aim was to achieve representation of formally educated designers and design led professionals as well as academics and practitioners. By including three studies, involving diverse organisations and participants, the biases and uncertainties of convenience sampling were reduced.

Snowball sampling was the secondary sampling technique used for gathering additional participants in instances where existing participants identified potential people that could be included in the sample (Atkinson & Flint, 2003; Brewerton & Millward, 2001; Henry, 1990). Due to the nature of snowball sampling, it was recognised that it may introduce participants of like ideas and experiences into the project. The nature and size of each study and each population within the community of designers or working within the same organisation, however, meant this was inevitable. In this way snowball sampling was used as an informal method for expediting access (Atkinson and Flint, 2003) more than identifying unknown participants. While participants were not directly asked to provide further contacts in any of the three studies, participants frequently provided other potential candidates

and initiated introductions. In particular this extended the sample within the two case studies, where through everyday interactions within the organisational environments participants introduced the researcher to other potential participants (Henry, 1990). These referrals and introductions acted as a statement of trust and value between professionals and in so doing imbued me with 'characteristics associated with being an insider or group member' (Atkinson & Flint, 2003), thereby aiding organisational access. Thus, while snowball sampling was not an initial strategy for the research project it was a pragmatic decision that allowed greater access to a range of participants for the project.

3.2.3 Data collection methods

This research project which includes three studies used multiple qualitative methods of semi structured interviews, participant observation, and artefact analysis. One of the beliefs of case study and ethnographic methodologies is that multiple methods should be used in any investigation (Walford, 2009). This is because each method intrinsically has certain inbuilt biases and perspectives. Through using multiple methods, sources of data and studies these biases are reduced to construct a more holistic, objective and credible picture of design thinking in practice. The choice of studies and methods adopted were purposefully intended to inform and supplement one another as they addressed different layers of the phenomena from varying perspectives (Feilzer, 2010).

Each study was preceded by a period of access and familiarisation with individuals and organisations prior to obtaining ethics clearance and organisational approval for data collection. This familiarisation period allowed for a more informed analysis of the data obtained than would have been possible in other circumstances (see Chapter for more detail of studies in context). This section details the data collection methods of semi structured interviews, participant observation and artefact analysis.

3.2.3.1 Semi structured interviews

The primary data collection across all three studies was qualitative interviews. Interviews are essential sources of information in case study and ethnographic research (Hammersley & Atkinson, 2007; Yin, 1994). It is argued that through interviews researchers can best access participant views and interpretations of actions and events (Walsham, 1996). Interview data is also particularly useful for research that is interested in participant experiences with a phenomenon because it provides an opportunity to obtain descriptions of personal experience in the participant's words (Charmaz, 2003). However interviews are reliant on interviewees sharing experiences and knowledge which are always subjective perceptions relative to their past experiences and current circumstances (Walford, 2009). For example, Douglas (1976) describes four problems with interviews being misinformation, evasion, lies and the putting on of fronts from interviewees. Charmaz (2003) counteracts this suggesting that reflexivity on the part of the researcher can assist with avoiding some of these issues.

There are many potential influences on the interviewees in interviews. This includes their conception of the nature and purpose of the research, their opinions of the personal characteristics of the interviewer, the interviewer's questions, the interviewee's answers, and the interview environment (Hammersley & Atkinson, 2007). In light of these many influences, Hammersley and Atkinson (2007) suggest participant accounts can be used in two ways. First, they can be read for what they demonstrate about the phenomena to which they refer or second, they can be analysed in terms of the perspectives they imply, the discursive strategies they employ or even the psychosocial dynamics they suggest. Therefore while interviews provide rich individual insights and reflections it is recognised that they are not reliable alone in depicting a full objective picture of events or concepts. As this research project is focused on understanding how individuals apply design thinking in practice, this subjective method is valid in constructing the meanings and experiences attributed to these practices for individuals. However it has also been coupled with other data

collection methods, including participant observation and artefact analysis, to provide a more holistic view of events.

Semi structured individual and group interviews were used across all three studies of this research project. Five or six questions were asked according to the study context. Interviews were decontextualised (i.e. asking general questions about design thinking), as well as contextualised (i.e. discussing specific projects and examples of practice). The purpose of the interviews was to draw out the interviewee's own meanings and experiences related to the phenomenon under investigation. The interviews were conducted more as conversations, using the flexibility and flow of dialogue to cover question themes. The flexibility of the semi structured interview was preferred due to its more informal nature and its affordance to pursue ideas and ask new questions in response to interviewee insights (Charmaz, 2006). The interviewing process was 'open-ended yet directed, shaped yet emergent, and paced yet unrestricted' (Charmaz, 2006, p.28).

While each case study had its own interview protocol based on context and case aims (see 4.1.4.1, 4.2.2, 4.3.4.2), some questions and overall themes, as well as the interview process, were consistent across the three studies. All interviews were recorded using an MP3 recorder and transcribed by a professional transcription agency.

Prior to the interview participants were emailed the consent information letter and consent form to complete. Participants were advised that all information provided would be treated confidentially and that no identifying information would be used in any publication resulting from the research. It was also explained that while best efforts would be made and pseudonyms used, some work colleagues may be able to identify them. The consent process was explained and participants reminded that participation was voluntary and they could withdraw at any stage. Verbal consent for audio recording the interview was also obtained prior to commencement.

In the interview itself the researcher had two primary goals: to follow the line of inquiry as reflected in the protocol and to ask questions in an unbiased manner to serve the needs of the line of inquiry (Yin, 2009). Setting the stage then became an important process (Kvale, 2007) as it allowed the researcher to define the scope of the interview in general terms and the participant to become comfortable with the interview setting. Interviews commenced with an overview of the research project and a discussion of the interview's purpose in general terms. This discussion of the interview purpose transpired in a broad manner so as to provide participants with the opportunity to tell their own story and to avoid imposing any pre-defined ideas on data obtained.. Interviews were co-constructed between interviewer and interviewee and conducted as guided conversations where questions were fluid however still pursuing a consistent line of inquiry rather than structured queries (Yin, 2009). Participants were informed that the aim was to have a conversation about how they applied design thinking in practice and that the focus was on their experiences using design thinking in large organisations.

The interview questions then inevitably shaped the interview process. Due to the conversational nature of semi structured interviews questions were introduced into the conversation as required, with the primary aim being to cover all the areas of interest rather than systematically ask each question in order. A variety of question types were used across the interviews, including:

- follow up questions, to facilitate more detailed responses
- probing questions, to encourage participants to expand on points already made
- specifying questions, to prompt participants to talk about practicalities
- direct questions, which, while often closed in nature are useful to elicit responses on particular topics of interest
- structuring questions, to shape the course of the interview
- interpreting questions, to facilitate understanding of a participant's responses (Kvale, 2007).

Other techniques used during interviews included active listening, as well as silence, to provide participants with time and space to think through their response. Notes were also taken during the interview for the purpose of capturing key quotes and details as well as an aid for possible leads to probe.

3.2.3.2 Participant observation

In case study or ethnographic research interviews are often used alongside participation observation (Atkinson, 2001). While interview accounts represent participant perspectives, participant observation represents the researcher's point of view. Participant observation involves fieldwork where the researcher establishes a place, usually with permissible access, within the social landscape they wish to study for the purpose of acquiring knowledge to represent the social life and processes that occur (Emerson, Fretz, & Shaw, 2001; Hammersley & Atkinson, 2007). It involves the researcher assuming a variety of roles within a case study situation. These roles include observer, as even a physical presence with no active participation will impact upon data production, as well as participant, being actively involved in organisational situations (Hammersley & Atkinson, 2007; Yin, 2009). Participant observation provides the opportunity to gain access to phenomena that are otherwise inaccessible to study and allows the researcher to perceive reality from the viewpoint of someone 'inside' (Yin, 2009, p.112). In this research project, participant observation was used as a data collection method in the Deloitte case study (See 4.3.4.1).

There are many challenges to participant observation to be considered. These are described in Figure 3.5 along with the strategies to limit their impact within the Deloitte field study.

Challenge	Why is it a challenge?	Strategy
Time consuming and resource intensive	Due to the need to be immersed for a significant amount of time within an environment in order to establish a deep understanding of the phenomena in context (Yin, 2009; Leonard-Barton, 1990)	In line with a pragmatist approach and case study methodology it was decided to constrain the Deloitte field study to a 14 week period.
Selectivity	It is difficult to gain broad coverage of events as a lone researcher and can be difficult to be in the right place at the right time to observe important events (Yin, 2009)	Being located in one office for the duration of the field study, the lines of inquiry followed were strategic however primarily responded to opportunity. Whatever was relevant and available to participate in and observed was.
Reflexivity	Events may proceed differently because they are being observed (Yin, 2009)	Participants did not distinguish between researcher and fellow employee and as such considered me the latter. This resulted in participants not feeling 'observed' but instead working with a colleague.

Participant and observer balance	A balance between participant and observer can be difficult especially when participating in organisational events and attempting to not influence or manipulate happenings (Yin, 2009).	To limit this, the researcher opted to participate in events wherever possible rather than lead or facilitate them. In addition, the researcher only acted in a role of advisor when directly asked to.
---	--	---

Figure 3.5: Challenges of participant observation and limiting strategies

Participant observation requires more than gaining access to, immersion with and observation of participants within a setting, but also requires producing written accounts and descriptions of these settings. The participant observation commenced with the daily representation of observations and reflections in the form of written field notes (Emerson et al., 2001); which act as written records of observational data (Hammersley & Atkinson, 2007; Jackson, 1990) and consist of descriptions of events, persons, places, social interactions and the contexts in which they occurred (Montgomery & Bailey, 2007). Van Maanen (1988) extends this to describe field notes as an ongoing stream of consciousness; a commentary about what is happening in the research that involves both observation and analysis (Eisenhardt, 2007). These written accounts allow the world to be reviewed, studied and thought about time and time again (Emerson et al., 2001). As representations, field notes are inevitably selective and as such never provide a complete record (Emerson et al., 2001). Rather they are subjective and temporal, capturing descriptions and insights at a particular moment in time.

In this research project participant observation, including field notes, was only used in the Deloitte case study. Data was collected through observation of projects, the social workplace environment and informal conversations during the study period using field notes. Participant observation was a suitable method for this case as it allowed an in

depth understanding of how design thinking in practice was being introduced across the organisation and allowed direct observation of people's experiences in applying design thinking and its meaning for them. Within the proposal between the researcher and Deloitte it was agreed the researcher would take on two roles during the residency, one of researcher and the other of subject matter expert in the area of design thinking. The role of researcher involved data collection relating to this research project of participant observation, conducting interviews and artefact analysis. The role of subject matter expert included providing guidance and coaching to Deloitte employees, leading workshops, and contributing to client or internal project work. It should be noted that instances where the researcher embodied the role of subject matter expert these interactions and projects are not included in the data collection to remove potential for researcher influence on the data. Detailed research procedures are discussed in the individual case (see 4.3).

3.2.3.3 Artefact analysis

Often overlooked in ethnographic methods are artefacts (Hammersley & Atkinson, 2007). Many social and complex organisational environments are self documenting, where participants are involved in the production, use and circulation of various kinds of written and visual material (Hammersley & Atkinson, 2007). Artefacts may be in any media and range from notes, models, charts, timetables, emails, records and reports. Artefacts influence activities and may also be created from them. As such they often provide significant information about the setting being studied or its wider contexts (Prior, 2004), which may verify or challenge data from observations and interviews (Hammersley & Atkinson, 2007). Consequently documentary sources provide a third perspective that assists in obtaining a meaningful and credible construction of the setting being studied.

Using artefacts as a data source has several benefits:

- Artefacts are static and can be reviewed repeatedly (Yin, 2009).

- Artefact analysis is an unobtrusive data collection method as the artefacts are not created as a result of the study and so researcher influence is not a factor (Yin, 2009).
- Artefacts provide a more objective and factual perspective of the organisation, which can provide a useful source of historical and contemporary data of time, situations, people and settings to build contextual understanding (Yin, 2009).

There are however challenges also:

- Potential biases of organisational authors who created the artefacts should be taken into consideration.
- Retrievability and access to artefacts is a challenge as access may be withheld (Yin, 2009).

As such artefacts should be used in conjunction with other data collection methods to develop a more comprehensive perspective on the phenomena under investigation.

Artefact analysis was used within the two case studies of Second Road and Deloitte. Artefacts were collected as access allowed and as deemed relevant to the study context. This ranged from informal artefacts such as individual or group visualisations or written notes, to formal artefacts such as organisational reports and models. Informal artefacts provide insights into key points of importance throughout an organisation's practices representing subjective perspectives. In comparison, formal artefacts often assist in representing the organisation's objective truth of a project or event. It was a suitable method for this research investigation as it supported other data collection methods and provided another perspective from which to understand and construct a meaningful representation of design thinking in practice.

3.2.4 Principles of the constant comparative method for data analysis

This section details the data analysis principles and process for the research project. It presents a discussion of the principles that informed the use of the constant comparative method for data analysis drawn from constructivist grounded theory.

Data analysis is described by Eisenhardt (2007) as ‘the most difficult and the least codified part of the (research) process’ (p.539). Hammersley & Atkinson (2007) agree, discussing that the analysis process of case study and ethnographic research is treated as a ‘mysterious process’ with ‘no guidance given’ (p.162). As a result, both case study and ethnographic methodologies have been criticised for their often thin descriptions and disconnected conceptualisations (Charmaz, 2006). The unstructured nature of some data collected, in the form of field notes, transcriptions, images, and artefacts, adds to this, as it is not pre-organised into a set of analytic categories (Hammersley & Atkinson, 2007). Charmaz and Mitchell (2001) argue that grounded theory techniques can sharpen the analytic edge of ethnographic research as it builds systematic checks into data collection and analysis. The constructivist revision of grounded theory in particular, outlines guidelines for data analysis that are ‘systematic, yet flexible’ and offers a ‘set of general principles and heuristic devices rather than formulaic rules’ (Charmaz, 2006, p.2).

A constructivist grounded theory approach is being used for data analysis in this research project due to its pragmatist underpinnings as well as being a strategy for bringing together diverse data and adding rigour to the analysis process. Similar to ethnography, it is focused on discovery rather than verification and as such is concerned with analysing data to develop theory, rather than testing a hypothesis. Grounded theory is an inductive rather than a deductive method. Grounded theorists construct ‘analytic codes and categories from data, not from preconceived logically deduced hypotheses’ (Charmaz, 2006). Hammersley and Atkinson (2007) however discuss that the development of analytical ideas is rarely purely inductive but

recognises that 'theoretical ideas, common sense expectations and stereotypes often play a key role' (p.165).

While induction is at the core of grounded theory, Charmaz (2006) describes that grounded theory also has an abductive quality. This sentiment of abduction echoes that of Morgan's (2007) within a pragmatist approach to research (see 3.1.1), where abductive reasoning is the connection between data and theory. Reichertz (2007) agrees, discussing abductive reasoning in the development of completely new codes as an 'intellectual jump which adds something very new to the data, something that they do not contain and that does not already exist as a concept or theory either' (p.225). This notion of abduction recognises the active and vital role of the researcher in the research process, particularly in the developing dialogue between the researcher and the data from which codes and categories emerge (Charmaz & Henwood, 2008). The notion of abduction further acknowledges that data analysis is inherently subjective, as the researcher naturally has predispositions, beliefs, values and interests that shape and influence research inquiry (Darke et al., 1998). In this way it is related to ethnographic data analysis, which is a reflective, thoughtful process and where data is 'materials to think with' (Hammersley & Atkinson, 2007, p.158). Constructivist grounded theory strengthens these analytical guidelines however, by attending to issues such as reflexivity, the research context, the inescapable effect of prior knowledge and existing literature (Charmaz & Henwood, 2008). This reflexivity and care is important in analysing and interpreting qualitative research data as a way to bring together and make sense of diverse data (Feilzer, 2010; Greene, Benjamin, & Goodyear, 2001). Constructivists seek abstract understanding of empirical phenomena as situated knowledge (Charmaz & Henwood, 2008).

While Charmaz and Henwood (2008) describe in detail a set of six guidelines for conducting analysis using constructivist grounded theory these fall into three broad steps which are sufficient for adapting this systematic approach for the research in this thesis:

1. Coding: the researcher works through the data looking for its potential implications for the research investigation. Data fragments are labeled with a code that represents the insight within the data. The most frequently used codes or those that seem most significant are applied to larger segments of data.
2. Categorising: Codes are analysed, compared and developed into categories.
3. Theorising: Throughout the process research notes are made. These notes might unpack a concept, define a category, or make comparisons and are then sorted and integrated into findings.

These steps highlight one of the most common characteristics of grounded theory, that is, the constant comparative method. The constant comparative method forms the basis of grounded theory analysis. As the name implies, the process involves repeated and ongoing comparison. First, data is compared with other data. Second, data is compared with categories to explore its 'fit' and flesh out the categories. Third, categories are compared with categories to establish relationships between them and further develop the categories. Finally, as the researcher works towards higher levels of abstraction, categories are compared with concepts (Charmaz, 2006; Hood, 2007). In this way it provides a systematic approach to dealing with data within each of the three studies and also for cross study comparison. The three steps of coding, categorising and theorising are now explored in further detail.

3.2.4.1 Coding

In the early stages the aim is to use the data to think with (Hammersley & Atkinson, 2007). Charmaz (2006) suggests two guidelines for initial coding that underpin the constructivist grounded theory approach to analysis. First the researcher must 'stick closely to the data' (Charmaz, 2006, p.47) and work through it to determine initial codes. The process of initial coding is for the purpose of understanding the situated meanings - what people are doing, why, and within that how people interpret and evaluate the situations they face and their own identities (Hammersley & Atkinson,

2007). All codes at this stage are provisional and the process of coding is recurrent, as new categories emerge, previously coded data must be read again to see whether they contain any examples of the new codes. The aim is to reach a position where a promising set of categories has been identified and a systemic coding of all the data across those categories has been carried out (Hammersley & Atkinson, 2007).

Second, focused coding is undertaken where the researcher must approach coding with openness to code 'everything they see *in* the data' (Charmaz & Mitchell, 2001), rather than attempt to fit the data into pre-existing categories (Charmaz, 2006). In focused coding the researcher takes the most frequently used codes, or those that seem the most significant, and applies these to larger segments of data (Charmaz, 2006). The researcher examines each item coded in a category and compares its similarities and differences with other data coded in the same way. This deepens the understanding, clarity and differentiation of categories and aids the specification of subcategories (Hammersley & Atkinson, 2007).

Codes developed in the focused coding phase are typically more abstract and provide a more conceptual understanding of the data from which to develop categories (Charmaz & Mitchell, 2001; Charmaz, 2003).

3.2.4.2 Categorising

In constructivist grounded theory throughout the analysis process notes are written about particular data or experiences with data collection; and they explicate analytic codes and tie them to data (Charmaz, 2003, 2006). In this way, they are closely related to the personal reflections, sensemaking and analysis that form a component of ethnographic field notes.

After coding initial categories are developed. Using notes allows the researcher to deconstruct their codes and by doing so, move them to a more analytic level whereby the codes develop into conceptual categories (Charmaz, 2003). Writing notes allows

the researcher to document the properties of a category, specify conditions that must be present for the category to apply, explicate the relationships between categories and link specific segments of data to categories (Charmaz, 2003). Within this research project, notes have played a role within each study during data collection, as field notes or reflections during and after interviews. They also played a significant role in the analysis process to provide description and define each category's scope. Categories are then compared within and across studies within the research project to further define and synthesise emerging patterns. This allows the researcher to integrate notes and to compare and develop theoretical links between (Charmaz, 2006).

3.2.4.3 Theorising

The final step in grounded theory analysis is theorising. While this process is designed to allow the researcher to construct grounded theory, the aim of this research project is not to construct theory. Instead the purpose is to use this process for theorising - to develop an informed critical account of design thinking in practice. This is used in the same vein as Hammersley and Atkinson (2007) where 'grounded theorising' (p.158) is used rather than 'grounded theory' to distinguish it as an activity rather than a procedure, and to differentiate it from the product of the activity: grounded theory. Instead, theorising is an iterative reflective process moving between data and ideas that allow the researcher to see possibilities, establish connections and ask questions (Charmaz, 2006; Hammersley & Atkinson, 2007). In this regard analysis reverts back to an ethnographic sensibility, where analysing is not just a matter of managing and manipulating data but is also about importing concepts from the literature and previous studies to illuminate the data further and draw informed and relevant conclusions from this (Hammersley & Atkinson, 2007). Literature that is both similar to and in conflict with the emerging conclusions was used in order to critically discuss and validate findings (Eisenhardt, 2007). The goal was to identify stable features within findings that transcend the immediate context for the purpose of transferability (Hammersley & Atkinson, 2007).

3.2.5 Constant comparative method of data analysis in practice

This section describes how the constant comparative method of data analysis was conducted within and across cases to determine the findings presented within this thesis. For this research project analysis was based on the data and initially driven by the research question. Preliminary analysis occurred within and at the end of each study. This involved taking a sample of data collected in a study and using the constant comparative method to identify initial codings. These codings, in conjunction with field notes, were used to inform data collection of the subsequent study. In this way each study built on the previous one. For example, in the Second Road case study eight interviews were transcribed. These were then critically read and given initial codings. The codings and insights from this process informed the research strategy and design for the Deloitte case study and also the interview protocol for the Expert Interview study. As data collection for the latter two studies overlapped, the insights gained from each influenced the progress and perspective taken of the other.

At the completion of data collection transcription for all interview data across the three studies was completed by a professional transcription agency. Following this a full, comprehensive and systematic analysis occurred. Data analysis included both within-study and cross-study analysis. Within-study analysis allowed the researcher to cope with the large volume of data generated while also becoming intimately familiar with each study as a stand-alone entity (Eisenhardt, 2007). This allowed insights and patterns from each study to emerge before generalising these across cases (Eisenhardt, 2007). The analysis was action oriented, focusing not on events as objects but as social constructions.

Analysis commenced with the Expert Interview study due to its ability to provide a high level view of the phenomenon, which could then be contextualised within the case studies. Analysis commenced with data familiarisation, where interviews were read in

full without any notes or coding. Following the second reading of interview transcripts, coding was undertaken by hand, using highlighters and notes, across all data collected within a framework of constant comparison. Data was read line by line and each transcript read several times to ensure consistency of understanding and coding across the interview set. Codes were drawn from the data, the literature or 'observer identified' (Lofland, 1971) and developed and refined across the comparative readings. The initial analysis of significant codes and keywords in relation to the questions asked helped to inform further analysis of interviews through focused coding. Through this process Scrivener software was used to develop a network of categories related to the dimensions in understanding design thinking and the composition of design thinking in practice. In addition, reflections were captured and developed in relation to each category in the grounded theory tradition.

This same process of transcription, data familiarisation, coding, categorising and theorising was then applied to the Second Road case study. Following this, using the constant comparison framework, the Expert Interview study was revisited and compared with the Second Road case study. Data was compared with other data, codes and categories to establish relationships between them and further develop categories.

Finally the Deloitte case study then underwent the same process of analysis and was compared with and developed into categories in conjunction with the other two studies. After the development of categories and subcategories across the full set of data the final step of theorising was undertaken. In this stage, emerging patterns in the data were considered along with relevant literature and, using both sources, informed and relevant conclusions were drawn.

While it appears the analysis is linear it was non-linear and iterative, involving constant movement backward and forward between steps (Eisenhardt, 2007). In this way analysis, using constructivist grounded theory, was both a divergent and convergent

process occurring simultaneously, where new ideas and categories emerge from new data which was then applied to the whole data set and informed further data analysis.

3.3 Research trustworthiness

In this section the issue of research trustworthiness will be addressed for this research project, detailing construct validity, internal and external validity and transferability. It is recognised that quality issues are ongoing throughout the project and not just addressed at the time of research design.

As a measure to counteract biases and enhance construct validity in the research process multiple sources of evidence were used in and across studies to provide multiple perspectives on the phenomena (Miles & Huberman, 1984). As Leonard-Barton (1990) states: 'Multiple sources of evidence, if they yield similar results, are evidence of a constructs convergent validity' (p.255). In terms of this research project, multiple studies were used as well as multiple sources of data within each study. This strengthens study findings as the triangulation made possible by multiple data collection methods and multiple studies provides stronger substantiation of constructs (Eisenhardt, 2007).

Case studies are often seen as having low internal validity, in that it is difficult to rule out competing causal explanations and low external validity, and as it is hard to generalise findings from a single case to the population at large (Runyan, 1982). One of the key concerns for internal validity in case study research is making inferences of causal explanations. This occurs due to the researcher not being able to directly observe all events. As a result, the researcher makes inferences based on the evidence collected in regard to particular events resulting from earlier occurrences (Yin, 2009). As Harden and Thomas (2005) notes, in relation to systematic reviews, the combination of different methods in one study allows for a form of methodological triangulation. That is, different settings and data types can be juxtaposed to

complement and expand on each other to produce a richer account than possible with a single method. Again, method triangulation within and across studies within this research projects aided both internal and external validity. As each method has different kinds of validity threats, they provide a basis for checking interpretations (Hammersley & Atkinson, 2007).

In regard to external validity Stoecker (1991) shows there is no way to measure external validity in case study research. As a single case study is subject to limits in generalisability and several potential biases, such as misjudging the representativeness of a single event (Tversky & Kahneman, 1986)) or exaggerating the importance of data because of its ready availability, multiple cases have been used (Leonard-Barton, 1990). This multiple study design augments external validity and helps guard against observer biases (Leonard-Barton, 1990). As one measure, multiple studies are included in order to increase the potential for external validity and in so doing generalisability. However, as discussed previously, in line with a pragmatist approach, this project recognises that while findings may not be generalisable to a wide population, learnings and principles from these context-specific studies may reflect and be transferable to other settings. Transferability then, rather than generalisability, will be a tenet of this project.

3.4 Chapter summary

This chapter has discussed the approach informing this research project being founded within pragmatism and grounded within case study methodology. Ethnographic methods of participant observation, semi structured interviews and artefact analysis were used for data collection across three studies exploring design thinking in practice within organisational environments. The data analysis technique was described where constructivist grounded theory was used as the logic to inform analysis along with the constant comparative method to construct meaning from the data and the research procedures for the three studies was outlined in detail.

4 Cases in context

4.0 Introduction

This chapter details the context and qualitative research procedures for each of the three studies of Second Road, Expert Interviews and Deloitte Australia. A case study of consultancy Second Road was the first conducted using a retrospective approach, semi structured interviews and artefact analysis. The Expert Interview study followed and comprised a set of semi structured interviews. Finally Deloitte was a case study that used participant observation, semi structured interviews and artefact analysis as methods of data collection (see Figure 3.4).

This chapter has three main sections that detail each case within this research study. First, the Second Road case is outlined. Second, the Expert Interview study is outlined. Third, the Deloitte Australia case is presented. Each section contains contextual information for the specific case, including the organisational background and environment where relevant, and how access to organisations and participants was gained. Further it provides details regarding participants in each case, as well as recruitment, data collection procedures and protocols.

4.1 Second Road case

The case study of Second Road was the first completed in this research project. Second Road is a strategic innovation consultancy based in Sydney, Australia. The focus of this case was on understanding design thinking in practice from the perspective of design led professionals who were using the approach with clients in large organisations. This study had three aims:

- To understand the meaning of design thinking for Second Road as an organisation as well as for individual participants
- To gain insight into how design thinking is applied in practice, including tools and methods used
- To learn the skills and experiences of Second Road employees, which supported their roles as design led professionals.

Data collection comprised a set of semi structured interviews and a retrospective project review. The next section will detail the research procedures for this case study including the case context, gaining access, participant information, and data collection.

4.1.1 Case context

Second Road has been an exponent of design thinking for more than a decade. While they identify with the term design thinking, they do not use this term at the consultancy preferring other terms such as strategic innovation (Second Road, 2014). The consultancy works with clients from large organisations through employing ‘the arts of language and design’ (Second Road, 2013) to ‘help organisations create cultures that support strategy, innovation and empowerment’ (Second Road, 2011). This is evident in a publishing track record from some Second Road employees that discuss how design, framed within a discourse of rhetoric, offers a new approach to strategy and systems design and development (for example Golsby-Smith, 2007; Jenkins, 2008, 2010; York, Wicks-Green, & Golsby-Smith, 2010). This position on assisting organisations in designing intangible products such as strategy, services and systems, using design and language, ensured an appropriate fit for this research project. At the time of the study Second Road had approximately 40 staff.

To develop insight into how individual participants and Second Road as an organisation understood design thinking a set of semi structured interviews were conducted with a range of staff. To gain deeper insight for the purpose of understanding and exploring how design thinking is enacted in practice a retrospective project review was also

conducted on a client engagement between Second Road and a mid-tier engineering firm. This project focused on redesigning the engineering firm's client engagement process and value proposition. The project goal was to assist the firm in developing capability to communicate and package its value propositions in a manner commensurate with its ability to create and deliver value to its clients. The project team comprised a core team of three Second Road staff on the client site (supported by other Second Road members not on site) working alongside a client project team of six staff from the engineering firm. The role of the client project team was to provide content knowledge and experience, as well as to collaborate with Second Road in key elements of the project in order to learn and build internal capability. The core components of the project occurred across a three month period from September to November 2010. Data collected from interviews in conjunction with the project review provide insight into individual Second Road employee conceptions of design thinking, compared with a specific instance of practice.

4.1.2 Gaining access to Second Road

Access to Second Road occurred through using the researcher's network and first building a relationship with the organisation. The researcher's principal supervisor arranged an invitation to observe a client project Second Road were engaged on. The researcher was provided a primary contact, a senior member of Second Road, who acted as mediator between Second Road and the researcher. From this, over a three month period from September to November 2010, the researcher spent 15 days in the field with Second Road. As a novice researcher and also new to design, this provided direct experience and understanding of design thinking in practice and aided in developing research skills in the field. This experience of informal participant observation and tutorials provided significant lessons in the role of the researcher, considerations of access, challenges of observation and construction of field notes that have informed the researcher's practice. No data for the case was collected in this time, however the experience provided the opportunity to develop familiarisation and

understanding of Second Road's culture and practices as well as developing trusted relationships with some employees.

This period of observation and relationship building resulted in the opportunity to gain formal access to the organisation for primary data collection purposes. Organisational approval was gained for a set of interviews with Second Road employees to gain a broad understanding of design thinking within the organisation and also to conduct a retrospective audit on a project to examine more specifically how design thinking was applied in context. University ethics approval was also gained for each aspect. Ethics approval for interviews was received in October 2010 under SUHREC Project 2010/228. This was followed by approval for the retrospective project review that was received in February 2011 under SUHREC 2011/009 (see Appendix 1).

4.1.3 Participants and recruitment

This case study focuses on how Second Road apply design thinking in practice. As such, the primary criteria for inclusion in the study required participants to be employees of Second Road with experience in using a design thinking approach on client engagements. In total this study included 12 participants, 8 in the interview set and 5 in the retrospective project review (one participant engaged in both parts of the study) (see Figure 4.3). Participants included two females and ten males, ranging in age from approximately 25 to 60 years old, and representing an estimated one third of Second Road staff. Supplemental information in Figure 4.3 also shows that participants came from a variety of geographic backgrounds, with seven from the USA, one from the United Kingdom and four from Australia; with all holding a minimum qualification of a Masters degree. Two participants had received design education at both undergraduate and postgraduate level; five had received design education and either social science or business education; and five had not received any design education, instead having degrees in social sciences or other liberal arts. These details have not been included in Figure 4.3 to preserve the participants identities.

Participant	Gender	Professional experience (years)	Formal design qualifications	Individual or group interview (I or G)
SR_1	M	5-10	Y	I
SR_2	F	5-10	Y	I
SR_3	M	10-20	Y	I
SR_4	M	5-10	Y	I
SR_5	M	20+	N	I
SR_6	M	20+	N	I
SR_7	M	10-20	Y	I
SR_8	F	5-10	Y	I & G
SR_9	M	5-10	N	G
SR_10	M	20+	N	G
SR_11	M	10-20	Y	G
SR_12	M	5-10	N	G

Figure 4.1: Second Road participant information

Recruitment for both the interview set and retrospective project review was conducted via formal email invitation, which outlined project and participant information. For the interview set an email was sent to all Second Road staff and participants responded via return email if they were willing to participate. For the retrospective project review an email was sent only to those directly involved in the project, again with willing participants responding via return email. Opportunities to recruit further interview participants who were both accessible and available through direct conversations on site were also taken.

4.1.4 Data collection

Data was collected in two sets: a set of semi structured interviews and a retrospective project review of a client engagement. The interviews provided insight into participant conceptions of design thinking. The retrospective project review then explored how

design thinking was applied in practice, within the context of a specific project. The interview set coupled with the retrospective project review allowed the opportunity to determine espoused organisational design thinking practices and then critically review them through a retrospective study of one project.

Data was collected in three stages, both times on site at Second Road offices in Sydney. First, a set of six interviews was conducted over two days, on the 8th and 9th of November 2010. Second, a further three interviews were conducted over three days from the 4th to the 6th of April 2011 to complete the interview set. Also in April 2011, the retrospective project review was conducted which involved the critical analysis and review of a recently completed client project. This involved an analysis of project artefacts, observation of an internal project learnings meeting and a group interview with five Second Road project participants to discuss the project process and outcomes. Data was analysed using the constant comparative method (see 3.2.4).

4.1.4.1 Interview set

The interview set comprised nine semi structured individual interviews ranging from 20 to 60 minutes in duration. All interviews were audio recorded and conducted face to face on site at the Second Road offices. A uniform interview procedure was applied across all interviews for consistency (see 3.2.2.2 for further information regarding the semi structured interview approach). The interviews included the following question themes:

- What does design thinking mean to you?
- What does design thinking mean to Second Road?
- How did your background prepare you (or not) to work in this area?
- How does design thinking operate in practice? What methods and tools do you use?
- What do you think is the future for design thinking?

The aim was to determine individual and organisational understanding of design thinking as well as to provide insights into Second Road design thinking practices.

4.1.4.2 Retrospective project review

The retrospective project review draws on standard case study procedures in organisational research settings and collects data about past events (de Vaus, 2006). While retrospective studies often focus on change over time, this case uses contemporary data from the interview set with retrospective data from the project review to understand the phenomenon in greater depth and from multiple perspectives (de Vaus, 2006). While the interview set provided insights into the broader, decontextualised aspects of design thinking in practice at Second Road the purpose for the retrospective project review was to provide a specific, detailed and contextualised example. This allowed not just observation and reflection at the time of events but also a holistic reflection with the benefit of hindsight.

Using a retrospective study was chosen for reasons of efficiency and pragmatism. A project review is an efficient way to collect data, especially in comparison to a participatory approach. In this case data was collected across a five day period. It is however acknowledged some data richness was compromised for efficiency (Leonard-Barton, 1990). Furthermore it was a pragmatic and ethical decision. As Second Road is a consultancy there were challenges in regard to obtaining access for participant observation as it required both permissible access from Second Road as well as the client. As the phenomena under investigation was primarily concerned with Second Road's practice as compared to the client context, it was decided a retrospective study which critically reviewed design thinking in practice in context of a specific engagement was suitable for overcoming ethical and access considerations.

The retrospective project review was conducted on a client engagement with a mid tier engineering company based in Melbourne. This was the project the researcher had previously observed during the period of familiarisation and relationship building with Second Road. This retrospective project review occurred three months after the

conclusion of the project. This project was chosen because occurrences within the project were relatively fresh in the participant's memories.

There were two stages to the project review. The first stage was the audit of project documentation. This involved a comprehensive critical review and analysis of project documents and artefacts. The purpose of this was to reconstruct and understand the project from commencement to conclusion. Artefacts included formal project documents (e.g. the final report); and informal documents (e.g. printouts from electronic whiteboards, photographs of activities and dialogue maps, Second Road team meeting notes, and personal notes taken by Second Road team members). Field notes reflecting on the artefacts were completed at the time and digital images were recorded where they were thought relevant. Additionally, the audit coincided with an internal project learnings meeting, which the researcher observed. This allowed for further understanding to be obtained of the complexities and occurrences that impacted on the project.

Following the audit of project documentation a group interview was conducted that lasted approximately 90 minutes. A group interview was chosen in this circumstance due to limitations on participant availability. Participants were informed the interview focus was on their experiences within the specific project. The interview comprised five participants, four core project team members and a fifth person who was a new member of staff who took part for learning purposes and contributed some external insights along with reflections. The artefact analysis was used to inform interview questions. While activities and conversation points were well documented in artefacts, how these conversations started or were facilitated was less apparent. Question themes covered in the interview included:

- What do you mean by conversation?
- What role did conversation play in the design process?
- How did you stimulate and facilitate conversation toward the desired activity or design outcome?

- What was the relationship between activities, artefacts and conversation in design thinking?
- How did you use conversation to enable design thinking? What other tools and methods did you use as well?

The questions allowed for clarification and discussion on how various aspects of the project were conducted that were not easily reconstructed from artefacts (Brewerton & Millward, 2001). The combined methods of artefact analysis and interviews within the retrospective project review allowed a deeper understanding of the rationale for how the project was conducted along with the outputs of practice.

Summary

This section has described the context for the Second Road case within this research project. It has discussed how access was gained to conduct research at Second Road, as well as provided an outline of participants and how they were recruited. Further, data collection procedures for the two sets of data collected of interviews and a retrospective project review have been documented. The next section describes the research context and procedures for the Expert Interview study.

4.2 Expert Interview study

The Expert Interview study was the second study undertaken within the project, however the last to conclude. It was a strategic and practical decision to gather information through an interview study as a method for accessing multiple perspectives to learn about design thinking in practice across the globe. The purpose of the interviews was to understand interviewee conceptions and experiences of design thinking in practice across a broad range of contexts and to determine any commonalities. Aims for this case study were to:

- Gain a wider insight into the meanings of design thinking
- Understand what comprises design thinking in practice

- Explore the application of design thinking with or within large and enterprise organisations in a variety of contexts
- Investigate the roles design led professionals embody in leading projects which use a design thinking approach

Data collection comprised a set of semi structured interviews. This section will detail the research procedures for this case study including the participant information, recruitment and data collection.

4.2.1 Participants and recruitment

This sought to include academics and practitioners who were actively working in or researching the field of design thinking. Primary criteria, which deemed individuals as a sufficient expert for inclusion in the study, required:

- A minimum of three years experience in researching and/or practicing design thinking
- A respected reputation internationally for research and/or practice in design thinking or related disciplines focused on designing intangible products, systems or services.

In total, 13 individuals participated in this study (see Figure 4.5). Participants included four females and nine males, ranging in age from approximately 25 to 60 years old. It was purposeful to interview a diverse range of participants in order to gather a broad data set that represented multiple perspectives. As such participants were recruited from Australia, Austria, England, France, Ireland, Netherlands, Scotland, and the United States of America. In addition, participants included four academics teaching and researching in the area, ten agency consultants who work with large organisations (some of whom also worked as academics), and two individuals embedded in internal design teams within large organisations. All held a minimum of a Masters degree qualification, with four participants having a Doctorate. Overall seven participants had

formal design qualifications, with the remaining six participants having diverse backgrounds ranging from business, social science, information technology, liberal arts and education. These specific details have not been included in Figure 4.5 to preserve participant identities.

Participant	Gender	Professional experience (years)	Formal design Qualifications	Academic (A), consultant (C) or internal design team (I)	Geographic location (continent)
EL_1	F	3-5	Y	C	Europe
EL_2	M	20+	N	A, C	Europe
EL_3	F	10-20	Y	C	Australia
EL_4	M	20+	Y	C	North America
EL_5	F	10-20	N	A, C	Europe
EL_6	M	10-20	Y	A	North America
EL_7	M	5-10	Y	C	Europe
EL_8	M	20+	N	C	Australia
EL_9	F	10-20	N	I	Australia
EL_10	M	10-20	Y	I	Europe
EL_11	M	20+	N	C	Australia
EL_12	M	20+	N	C	North America
EL_13	M	3-5	Y	A, C	Europe

Figure 4.2: Expert interview study participant information

The researcher relied upon her professional network to recruit participants for this interview study. Participants were primarily people the researcher had personally interacted with face to face, via email or through social networking channels LinkedIn and Twitter. Some participants resulted from snowball sampling where the researcher was introduced via a mutual professional contact. As a first step an invitation to participate was sent to prospective participants, either by email or private message on Twitter, which contained a link to formal documentation. This documentation included a covering letter detailing the research background and interview process; the consent

information statement, which included further information about the research, participant participation and privacy; and a consent form. If no response was received after four weeks a follow up communication was sent. If a response was still not received this was accepted as a decision not to take part in the interview process. Recruitment was targeted for a total of 20 people who were invited, 15 agreed to participate while written consent was only received from 13 participants, who comprise the final set.

4.2.2 Data collection

This study contains a set of 13 semi structured individual interviews. Interviews were conducted between May 2011 and January 2012 and ranged in duration from 45 to 90 minutes. Three interviews were conducted face to face and 10 via Skype due to the geographic dispersion of participants and the researcher. All interviews were conducted at a time of convenience to the participant and audio recorded. When using Skype the video functionality was preferred, however the participant ultimately determined this. Interview questions were constructed and applied across all interviews for consistency. These included:

- What does design thinking mean to you?
- What do you think are the core values and characteristics of design thinking?
- Tell me about an experience you've had applying design thinking within organisations.
- What methods and tools do you use to enable design thinking within organisations?
- From your experience, what role does conversation play in facilitating and enabling the design thinking process?
- How do you facilitate conversation toward desired design outcomes?
- What roles do you embody leading a design thinking process?
- What do you think is the future of design thinking?

The purpose of these interviews was to understand interviewee conceptions and experiences of design thinking and determine insights into how individual's applied design thinking in practice (see 3.2.2.2 for further information regarding the semi structured interview approach). While the overall research question was refocused and refined during this project, which lessened the priority of questions regarding conversation, these still provided valuable insights and were asked across all interviews to maintain consistency in approach. At the conclusion of the study, interviews were transcribed and analysed using the constant comparative method (see 3.2.5).

Summary

This section has described the research procedures for the Expert Interview study. It has provided a description of participants and how they were recruited. In addition, the interview process and protocols have been documented. The next section describes the research context and procedures for the Deloitte Australia study.

4.3 Deloitte Australia case

The final case within this research project is a participatory case study of Deloitte. This case builds upon both the Second Road and Expert Interview studies as it examines an organisation's experience of learning how to integrate design thinking into their work practices. This study aimed to develop an understanding of design thinking across the organisation, including:

- The meaning and practice of design thinking
- Investigating the tools and methods used in design thinking in practice
- How a design thinking culture was being enabled

Originally research aims also intended to consider how design thinking was being enabled internally as well as externally with clients and follow a number of projects from commencement to completion. However research aims were amended due to

available and allowable access to projects and people; and due to the researcher overestimating the maturity of design thinking and level of activity across the organisation.

Data collection comprised participation observation, semi structured interviews and artefact analysis. This section will detail the research procedures for this case study including the case context, gaining access, participant information and data collection.

4.3.1 Case context

Deloitte Australia is a large professional services firm that provides a range of services to other businesses in the areas of audit, tax, financial advisory and consulting. At the time of study Deloitte employed over 5500 staff in 12 offices across Australia. While the organisation has a strong innovation culture and commitment to customer advocacy, it was largely operating within an analytical business environment.

Design thinking began to be mentioned in various organisational documents, presentations and forums in late 2010. In early 2011 Deloitte made a strategic commitment to integrating design thinking into the organisation's work practices for the core purpose of assisting to fulfill the organisational vision of redesigning the experience of professional services for clients (DA_5). It was also viewed as an opportunity to 'innovate innovation' (DA_5) and reinvigorate their innovation journey. A senior executive made it very clear that 'the hypothesis that we are working on is that design thinking will become a way of thinking for our organisation. Not design thinking as a limited capability that only does things' (DA_2, p5).

In March 2011, 12 members of the Deloitte Australia national executive team visited San Francisco for a one week introduction to design thinking. The team

participated in a design thinking course delivered by Stanford University. This course introduced relevant theory and included a number of site visits to organisations such as IDEO, Kaiser Permanente, Autodesk and the Stanford d.school. On these site visits the team were able to experience design thinking first hand and engage with design professionals (DA_5, p3).

Following this, Michael Barry of Stanford University and Sarah Beckman from the Haas School of Business at Berkeley were engaged to introduce design thinking and began to build capability across the organisation. This resulted in a one week intensive program held in Sydney in April 2011. It comprised 120 Deloitte employees, primarily Partners, however all levels of the organisation were represented. The program consisted of a two day training boot camp in which participants learned design thinking principles and case studies, practical tools and techniques. These included an introduction to ethnographic research, defining problems, and prototyping. For the majority in attendance, which represents just 2% of Deloitte employees, this program was their first exposure to and experience of design thinking. This intensive program and Beckman and Barry's resources form the foundation for design thinking at Deloitte (for example Beckman & Barry, 2007).

This boot camp was followed by a three day intensive workshop for a subset of participants. This acted as a project kick off where teams attempted to apply a design thinking approach to one of six strategic projects. These sessions were largely unfacilitated, with Beckman and Barry periodically moving between groups. These six projects continued following the intensive program, with Beckman and Barry providing some support via teleconferences and feedback on progress reports. These internal projects ranged from redesigning internal processes, programs and communications to designing new business opportunities.

While there were strategic attempts through events such as the intensive program and several presentations throughout the organisation, the general

approach was to allow design thinking to go 'viral' in the organisation (DA_5). This was a conscious decision to allow all staff the opportunity to engage with it if they were interested through 'getting the word out, by creating this buzz in the organisation' (DA_5, p3). It was acknowledged this would result in varying levels of interest and capability across the firm. Outside of the six strategic projects, most notable were several projects in various service lines focused on how to build design thinking capability across teams and business units. Within these projects, intensive program participants took on champion roles, further developing design thinking understanding and capability within their respective departments in the organisation, known as service lines.

It should be noted that Deloitte had service lines within its business, such as Innovation, Online and Deloitte Digital, where aspects of design thinking has implicitly been part of their work practices for several years under several different guises of human computer interaction, user centred design or customer experience (Gilbert, Smith, Sutherland, & Williams, 2012). With design thinking moved to the fore within the organisation, these teams acted as champions. They provided springboards for further learning and adoption as other parts of the organisation became aware of their design practices and reached out for support and knowledge transfer.

This describes the history of design thinking at Deloitte and provides the context for the environment in which this participatory case study was conducted. Data was collected from June to September 2011. At the time of study design thinking had only been formally introduced to the firm for approximately four months. In addition, the six strategic projects were in various stages of progress and the organisation was still in the initial stages of communicating design thinking across the firm. This provided an opportunity to see how a large organisation was embracing the concept.

4.3.2 Gaining access to Deloitte Australia

Deloitte was specifically sought out by the researcher as an example of an organisation in the early stages of integrating design thinking into their work practice and culture. Gaining access to Deloitte occurred in two stages. First gaining formal organisational approval to conduct research in the firm, and second, once field work commenced, to gain access to relevant and appropriate research participants and projects.

4.3.2.1 Gaining formal access to the organisation

Gaining access to Deloitte was a complex process that progressed and evolved over a six month period. The researcher first made contact with an acquaintance in a Partner position at Deloitte Australia in January 2011. The purpose for this meeting was to determine if Deloitte was a suitable case study for the research project and if so, would they be interested in allowing a researcher access. The outcome of the meeting was a resounding yes on both counts, however despite following up via email on several occasions no response was received.

In February 2011, the researcher connected with a Director from a different service line at Deloitte via the social network Twitter. The first meeting occurred in late March 2011 to again determine interest in a researcher in residence. Another meeting in April 2011 followed this first meeting, with the Director and their supervising Partner to further discuss the details of a research partnership and formal requirements from both parties. Further to these meetings, the researcher prepared a comprehensive proposal outlining research background and aims, methods, benefits of participation, suggested time schedule and a program of work. In addition the proposal also documented necessary ethical considerations for the organisation including issues of commercial confidentiality and participant privacy. Following this, organisational approval for the research was received in May 2011. University ethics approval was then sought and received in June 2011 under SUHREC project 2011/098.

4.3.2.2 Gaining access to projects and participants

Although organisational approval was obtained for the research, once the study commenced, access needed to be established at team and individual levels to gain access to projects and participants. As Okumus et al. (2007) discuss, 'Once access has been gained, it becomes necessary to renegotiate entry into the actual lives of employees and managers...The researcher's personality, interpersonal skills, and particularly interviewing skills can play an important role at this stage' (pp. 9-10). The researcher was placed within a small team, with the Director who set up organisational access as her supervisor. The researcher was then left to develop her own research program, which began with understanding who and what she needed access to within the organisation.

Gaining access within the organisation meant being proactively involved in the everyday work environment, being very aware of what was happening across the organisation and seeking out opportunities. This was achieved in a variety of ways. First, Deloitte Australia has a very active Yammer network, an internal social networking site which the researcher utilised for gaining organisational understanding, building a profile and recruiting participants. In order to reach a wide audience across Deloitte and raise awareness of the researcher's presence, on the second day on site the researcher created a Yammer profile and posted a message (see figure 4.3).

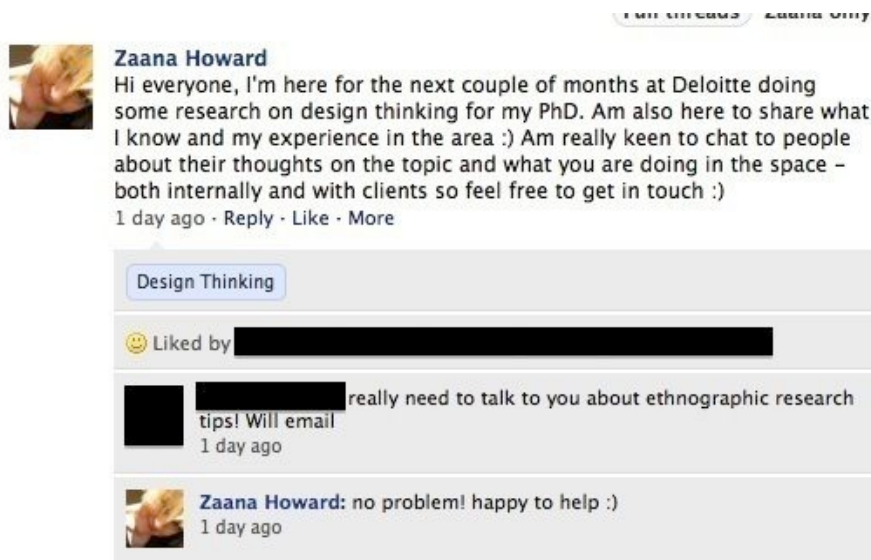


Figure 4.3: Introductory Yammer message

This proved to be successful with several senior executives requesting a meeting within minutes of posting the message. The researcher continued to use Yammer as a tool to participate in the organisation and build a profile to aid access and source participants. At the half way point of the study, the researcher also posted another message on Yammer inviting people to participate in the research more formally through an interview. Through being active on Yammer the researcher was also able to determine key people of interest to target as participants. In addition, through searching the history of the term “design thinking” on the site the researcher was able to develop a timeline of events and conversations to trace the history of design thinking in the company.

Second, gaining access to appropriate projects occurred in two ways: the researcher pursued project leads directly or the researcher was invited into projects by participants or through introductions. It is significant to note that the researcher was introduced to people as a subject matter expert in design thinking first, a doctoral candidate second. This was helpful in gaining credibility and access to participants as employees viewed the researcher more as a fellow colleague than as a researcher. This resulted in the researcher playing the dual role of participant and observer, as is often

the case when undertaking participant observation in organisations (Hammersley & Atkinson, 2007).

Third, the researcher comprehensively searched the Deloitte Australia intranet for articles, videos and other artefacts relating to the development of design thinking in the firm. The intranet was also a resource for understanding the history of the organisation and the context of the environment. It provided an aid for finding information about employees and understanding the hierarchy of the firm. This further aided in determining people and projects of interest. Once identified potential participants were emailed, telephoned or face to face meetings set up to establish a relationship and gain access to people and/or their projects.

Across the 14 weeks of the case study, access moved through four stages:

- i. making people aware the researcher was present and available in the organisation;
- ii. employees understanding how the researcher may be of value to them as a 'design thinking expert';
- iii. the researcher being sought out for advice and support on design thinking projects; and
- iv. the researcher being requested to lead design thinking initiatives.

These stages reflect the role of building relationships, gaining credibility and developing a reputation as a subject matter expert across the researcher's time at Deloitte. Over time more considerate discussions, regarding scope and boundaries of the role of the researcher, were had with participants to ensure the researcher was not viewed or treated as an employee and the data compromised.

In summary, gaining access was primarily a relationship building activity. Access commenced with the team the researcher was directly working in. Through meeting

people, proactively contacting potential participants, being invited to meetings and simple activities such as having lunch in the shared break room, the researcher was able to reach a diverse range of people and projects across the organisation that were suitable for the research project.

4.3.3 Participants and recruitment

As the case study focuses on how design thinking was understood and applied at Deloitte the primary criteria for inclusion in the study required participants to be employees of Deloitte who had some knowledge of, training in, or experience of using design thinking within the Deloitte organisational environment. In total, 40 individuals participated in this study (see Figure 4.8). Participants included 22 males and 18 females, ranging in age from approximately 25 to 60 years old. Only 3 participants had formal design qualifications while 23 participants had received some form of design thinking training from either attending the one week program in San Francisco or the one week immersion program in Sydney. Seventeen participants had received no training in design thinking but were attempting to apply it within internal projects and their work practices. Overall participants had diverse experiences and exposure to design thinking at Deloitte ranging from senior leaders leading design thinking initiatives; employees with training in design thinking; employees with no training but involved in various design thinking projects; and finally those with little to no exposure to design thinking in the organisation at all. Supplemental to information within Figure 4.8 participants were representative of all service lines across the firm. These details have not been included to preserve participant identities.

Participant	Gender	Level in the organisation	Office location (city)	Formal design Qualifications	Received design thinking training	Observed (O) or Interviewed (I)	Data included in final analysis
DA_1	M	Partner	Melbourne	N	Y	I	Y
DA_2	F	Partner	Melbourne	N	Y	O, I	Y
DA_3	M	Director	Melbourne	N	Y	O, I	Y
DA_4	F	Senior consultant	Sydney	Y	Y	O, I	Y
DA_5	M	Senior executive	Sydney	N	Y	O, I	Y
DA_6	M	Senior Executive	Sydney	N	Y	I	Y
DA_7	F	Partner	Adelaide	N	N	I	N
DA_8	F	Senior executive	Sydney	N	Y	I	Y
DA_9	M	Senior executive	Sydney	N	Y	I	Y
DA_10	M	Partner	Melbourne	N	Y	I	Y
DA_11	M	Senior executive	Sydney	N	Y	I	N
DA_12	M	Senior executive	Melbourne	N	Y	I	N
DA_13	F	Senior executive	Melbourne	N	N	I	N
DA_14	M	Senior executive	Sydney	N	Y	I	Y
DA_15	M	Senior executive	Sydney	N	N	I	N
DA_16	M	Senior executive	Sydney	N	Y	I	Y
DA_17	M	Senior executive	Sydney	N	Y	I	Y
DA_18	M	Senior executive	Sydney	N	Y	I	Y
DA_19	F	Consultant	Melbourne	N	N	O, I	Y
DA_20	F	Consultant	Sydney	N	N	O, I	Y
DA_21	F	Director	Sydney	N	Y	O, I	Y
DA_22	F	Consultant	Melbourne	N	N	O, I	Y
DA_23	F	Manager	Melbourne	N	N	O, I	Y
DA_24	M	Manager	Sydney	N	Y	I	N
DA_25	F	Partner	Sydney	N	Y	O, I	Y
DA_26	F	Consultant	Sydney	N	N	O, I	Y
DA_27	F	Manager	Sydney	N	Y	O, I	Y
DA_28	F	Senior Consultant	Melbourne	Y	N	O, I	Y
DA_29	M	Senior Consultant	Darwin	N	N	I	N
DA_30	M	Manager	Melbourne	N	N	I	N
DA_31	M	Director	Hobart	N	N	I	Y
DA_32	F	Manager	Melbourne	N	N	I	N
DA_33	M	Director	Sydney	Y	N	I	N
DA_34	M	Senior Executive	Sydney	N	N	I	N
DA_35	M	Senior Executive	Melbourne	N	Y	I	Y
DA_36	F	Partner	Melbourne	N	Y	I	Y
DA_37	M	Partner	Melbourne	N	Y	I	Y
DA_38	F	Senior Consultant	Sydney	N	Y	I, O	N
DA_39	F	Director	Melbourne	N	N	I	N
DA_40	M	Manager	Melbourne	N	N	I	N

Figure 4.4: Deloitte participant information

Participants were recruited in a number of ways across the study period through direct conversations, email and using the Deloitte Yammer internal social network (see 4.3.3.2). First, the Senior Executive team was targeted as desirable participants due to their exposure and active involvement in design thinking from a strategic and leadership perspective in the organisation. A personalised email was sent to each executive team member detailing the researcher's project and attaching the research consent information letter and offering the researcher's services to them as a measure of reciprocity. The purpose of this was two fold: to recruit the senior executives as participants as well as creating an opportunity to gain access to other potential participants and projects within their service lines. This approach resulted in interviews with all senior executives as well as participant and project access. Second, many participants were identified through everyday interaction and involvement in projects on site. These participants were recruited through direct face to face conversations. Third, as a method for trying to attract a broader set of participants, particularly from interstate, the researcher posted a message on the Deloitte Australia Yammer network calling for interview participants, including those who had knowledge of design thinking and had received training in design thinking and those who hadn't (see 4.3.3.2). Through this process I received seven respondents, which resulted in five interviews.

While the researcher was based in the Melbourne office, participants were not restricted to this site. Face to face contact with participants was preferable however it was not always possible, due to Deloitte staff being dispersed across offices and client sites across Australia. All participant observation occurred within Melbourne, however interviews were conducted face to face or via telephone for participants located interstate.

4.3.4 Data collection

This study represents a slice of organisational activity based on allowable access and timing. Research was conducted from 14 June to 19 September 2011. This was to consist of two days per week on site, however data collected involved seeking out and taking opportunities as they presented themselves. As a result, a total of 36 days were spent in the field across a 14 week period, totaling approximately 250 hours at the Deloitte office in Melbourne. The researcher took on two roles within Deloitte, those being of researcher and subject matter expert in the area of design thinking, as per the proposal agreed upon with Deloitte. It should be noted that instances where the researcher embodied the role of subject matter expert these interactions and projects are not included in the data collection to remove potential for researcher influence on the data.

Best efforts were made to collect data and gain a holistic perspective across the organisation of design thinking initiatives and to interview a diverse range of employees across service lines and at various hierarchical levels. Ethnographic methods were utilised and involved three types of data collection: participant observation, semi structured interviews and artefact analysis. All data was analysed using the constant comparative method.

4.3.4.1 Participant observation

Participant observation provided the opportunity to develop a deep and broad understanding of Deloitte's culture, strategy, everyday practices and environment. This contextual insight underpinned the aims for the study and provided a rich picture in which to understand the organisation's motivations and approach in introducing design thinking practices into the organisation. Participant observation primarily took place on site at the Deloitte offices in Melbourne. On occasion the researcher was off site for telephone meetings or for workshops where a more creative environment was desired.

Participant observation involved observing the work of participants on a project when they were applying design thinking. This included direct observation where the researcher was physically present, for example preparing for or conducting a workshop. It also included indirect observation where the researcher was involved in a project and participated via email and telephone conversations as a project progressed. Overall the researcher observed and participated in various stages of ten diverse projects where a design thinking approach was being applied or which focused on building design thinking capability. Due to the limited time in the field and the nature of the projects the researcher did not have the opportunity to participate in a project from commencement to completion, but instead observed projects at various stages.

Participant observation in this environment required considerable administration. As the organisation's primary form of communication was email and meetings, creating contact via email and scheduling meetings with people was the easiest way to meet someone and commence building a relationship. As such, a considerable amount of time in the environment was spent in standard corporate style meeting rooms (these were used for both face to face and telephone meetings) or within a pod of workstations.

Being in the field required constant critical evaluation on the events of the day as they occurred, considering questions such as: What is happening? Why is it happening? What does it mean? and Is it significant? Field notes were used to document observations and reflections. The majority of the time the researcher was able to capture notes as events occurred in the field, particularly in meetings or observing practices from the researcher's workstation. There were times however, when notes could not be captured immediately. For example in workshops, due to their participatory nature or during informal conversations or 'coffee catchups'. Notes were taken as soon as practicable after the event on the same day. At the end of each

fieldwork day the researcher reconstructed the events of the day, using recall and notes taken in the field and revising them into comprehensive field notes with critical reflections. In this way the notes served as a running log written at the end of each day (Jackson, 1990), where 'the task was to...record as much as possible of what was perceived to be relevant to the research project so that there would be a record that could be used later in the analysis and writing process (Walford, 2009). This was to ensure details of significance were not lost due to fallibility of memory or misunderstood notes.

4.3.4.2 Interviews

To complement researcher observations and experiences 35 semi structured individual and group interviews with a total of 40 participants were conducted, ranging from 20 to 70 minutes in duration. In the final study analysis the total number of interviews included has been reduced to 20 as data saturation had been achieved (see Figure 4.8). While it was preferable to conduct interviews face to face, due to geographic reasons, 14 interviews were conducted via telephone. Audio recording of telephone interviews was conducted where possible however it was not always appropriate depending upon the participant and context. In these instances notes were taken at the time to capture key quotes and phrases and as soon as practical written up in full as field notes.

A uniform interview procedure was applied across all interviews for consistency. These interviews focused on understanding interviewee conceptions of design thinking, how they were applying design thinking (including tools and methods) and successes and challenges with design thinking to date. Question themes covered in all interviews included:

- What does design thinking mean to you?
- What does design thinking mean to Deloitte?
- What's your experience with design thinking?

- How are you applying design thinking? What projects? What tools and methods?
- What are the challenges and successes of design thinking at Deloitte to date?
- What needs to happen next at Deloitte for design thinking to grow?

The aim was to determine consistency of understanding of design thinking as well as provide insights into how Deloitte were applying design thinking in practice.

4.3.4.3 Artefact analysis

The third type of data collection was that of collecting and analysing organisational artefacts relating to design thinking. These included emails, videos, presentations, documents and conversations on internal social networking sites. These artefacts provided another perspective from which to understand and contextualise organisational events.

Summary

This section described the context and detailed the research procedures for the Deloitte case study. It has discussed how access was gained to conduct research at Deloitte, as well as provided an outline of participants and how they were recruited. Further, data collection procedures for the three types of data collection of participant observation, semi structured interviews and artefact analysis has been documented. This study generated the largest set of data in this research project with the three types of data collection providing a variety of perspectives from which to critically understand how Deloitte understood design thinking and were integrating it into their work practices.

4.4 Chapter summary

This chapter has detailed the research procedures for the three studies of Second Road, Expert Interviews and Deloitte that comprise the research content in this thesis.

Study backgrounds and processes for gaining access, participant information, participant recruitment and data collection procedures and protocols for each study have been outlined. Each study was unique in its context and use of methods. All studies utilised semi structured interviews. In addition to interviews, the Second Road case also collected data via a retrospective project review. Further, the Deloitte study also used participant observation and artefact analysis. Conducting several studies and using multiple types of data collection allowed for a broad and deep understanding of design thinking in practice to be developed from numerous perspectives. The next chapter presents the findings and discussion from these studies in regard to dimensions of meaning in design thinking.

5 Dimensions of meaning in design thinking

5.0 Introduction

This chapter presents research findings and discussion in relation to the theme of dimensions of meaning in design thinking. Findings present design thinking as a complex concept. Through data analysis using the constant comparative method across all three studies (see 3.2.5), four categories emerged which make up the main sections of this chapter. First the category of understanding design thinking is presented which contains definitions and a discussion of the naming of design thinking. Second, perspectives on design thinking are introduced as ‘design thinking as a way of life’ and ‘design thinking as a way of work’. Third, the purpose and outcomes of design thinking are considered. The primary purpose of design thinking is highlighted as for problem solving, however the aspiration of the outcome differs dependent upon the perspective the individual takes on design thinking. Finally characteristics of design thinking are outlined in particular human centredness and empathy; collaboration; creative thinking; visualisation and prototyping which were common across the three studies. Findings are contextualised with appropriate literature to provide a theoretical base for the discussion of findings.

5.1 Understanding design thinking

This section presents research findings and discussion exploring participant views on understanding design thinking. It draws upon findings from the Expert Interview and Second Road studies, with no contribution from the Deloitte case. In their infancy in adopting design thinking it was evident Deloitte had not reached the capacity to critically consider the concept, instead accepting it at face value as it was presented in the organisation.

This section will demonstrate that findings both validate and extend upon the literature in respect to understanding design thinking (see also 2.1.3). Findings demonstrate that participants' consider current definitions and descriptions inadequate (for example the definitions of Brown, 2008; Martin 2009 which many were familiar with). It was acknowledged by participant and in the literature however that design thinking resembles a number of existing approaches which adds complexity to creating a consensual definition (Badke-Schaub, Roozenburg & Cardoso, 2010). Findings reveal however that participants are more concerned with the sentiment or aspiration of human centredness that underpins design thinking rather than the definition itself. Findings contribute to exhibiting the complexity of defining and understanding design thinking.

5.1.1 A lack of consensual definition of design thinking

Some participants demonstrated frustration in there being a lack of definition of design thinking. A number of factors emerged that have impacted this. First, design thinking sharply rose to popularity before a common understanding was established (see 2.1.3.2). This was a cause of frustration for a number of participants (EI_6, p.3; EI_7, p.11; EI_12, p.3). As one respondent expressed:

...there really is no definition of design thinking coming out of...anywhere... doesn't even have any sense making framework to say okay, this is how we're going to understand it (EI_12, p.3).

One participant further noted the best opportunity to define it is already lost due to its commoditisation before it was sufficiently clarified and defined (SR_3, p.8).

A number of participants were particularly skeptical of the commercial orientation of some who publicly advocate and market design thinking. In particular key proponent Tim Brown of IDEO was called out. Stated by one participant:

the resident definitions of design thinking that I've seen are from...Tim Brown and IDEO, which actually is just an eclectic gathering of design practices, like prototyping, fast iteration, sketching and so on so that it's kind of... thin (SR_5, p.7).

Further, EI_6 referred to design thinking as a 'commoditised branding exercise by Tim Brown' (p.3) and was disparaged by people buying into what the participant believed to be a marketing campaign rather than understanding the true foundations and cognitive origins of design thinking (see 2.1.1). This relates back to the concern regarding commoditisation prior to the establishment of a clear definition or an understanding of its origins. This results in cynicism of the concept and in turn leaves it open to individual interpretation and potential loss of meaning as a number of organisations seek to commercialise it, each with their own unique translation.

This lack of consensual definition is mirrored in the literature. Badke-Schaub, Roozenburg & Cardoso (2010) raise the issue of their being 'no consensual attempts to define design thinking' (p.44-45). Instead there is a cluster of authors contending to claim the space (for example, Brown, 2009; Fraser, 2012; Liedtka & Ogilvie, 2011; Lockwood, 2009) with each creating their own definitions, positions and bodies of work on design thinking (see Figure 5.1). While meanings are similar, they each have differing emphases according to author agendas. While this is not surprising, it adds a layer of complexity in creating a consensual definition or common understanding. For example, Liedtka and Ogilvie (2011) define design thinking as a systematic approach to problem solving and go on to introduce a process and set of tools for managers to implement design thinking. In the case of Fraser (2012) she disenfranchises herself from the term design thinking, instead preferring 'business design' (see 2.2.1.1) as a method for claiming the space. This adds another dimension to the issue of naming and definition where a different term is used to describe the same concept.

Author	Year	Term	Definition
Brown	2008	Design thinking	A discipline that uses the designer's sensibility and methods to match people's needs with what is technologically feasible and what a viable business strategy can convert into customer value and market opportunity (p.86).
Fraser	2009	Business design	A model for symbiotically delivering market value and enterprise value, embracing design factors such as fostering multidisciplinary collaboration, considering altogether new possibilities rather than aiming for incremental improvements, sourcing creativity from constraints, prototyping early and iterating quickly, and creating new and better models through systems thinking (p.58).
Liedtka and Ogilvie	2011	Design thinking	Systematic approach to problem solving (p.4).
Lockwood	2009	Design thinking	A human centred innovation process that emphasizes observation, collaboration, fast learning, visualisation of ideas, rapid concept prototyping, and concurrent business analysis, which ultimately influences innovation and business strategy (p.ix)
Martin	2006	Design thinking	Approaching management problems as designers approach design problems (p.512).

Figure 5.1: Definitions and descriptions of design thinking

Second, the term design thinking does not provide a clear expression of its meaning or value. Some participants felt it was too general and non specific in nature, resulting in misunderstanding of the concept (e.g. SR_1, SR_7). Respondent comments included: ‘...to me it [design thinking] doesn’t mean anything specific’ (SR_1, p.1); ‘design thinking was just kind of a made up word anyway’ (EI_4, p.11); and ‘I don’t think the term design thinking is helpful’ (EI_5, p.5). Further, some Expert Interview study participants (EI_2, EI_4, EI_5, EI_8) discussed Nussbaum’s (2011) position of design thinking being ‘a failed experiment’ as evidence of problems with the naming. Participants indicated this demonstrated the failure of the term to illustrate its meaning, resulting in its dismissal. However, the purpose of Nussbaum’s (2011) opinion piece was less about pointing out the inadequacies of design thinking but rather to market his position on creative intelligence which was the topic of his forthcoming book. The reliability of his comments then to validate participant arguments is questionable.

While participants discussed definitional concerns of the term, the sentiment that emerged from findings was closer to a desire to create a shared understanding of the concept. Participants were quick to identify the inadequacies of current definitions, however not one participant across the studies offered their own. Instead they drew upon existing definitions, or provided lengthy descriptions of design thinking attributes. More consolidation across the literature and industry by academics and practitioners would be beneficial to determine a common understanding. This will provide a more rigorous and robust base from which to build further understanding and empirical research.

5.1.2 Design thinking as a new name for existing approaches

Advocates of design thinking do not always acknowledge its origins within design and its relationship to other disciplines such as business and social science (see Chapter 2). This was a particular cause of grievance for academic participants within the Expert Interview study. One respondent emphatically discussed design thinking discourse not acknowledging its foundations within a number of disciplines stating: ‘what really pisses me off [is] when the new brand of design thinking [see 2.1.3] claims that it’s saying something for the first time. It completely doesn’t do its homework’ (EI_6, p.4). Another academic provided examples of the familiarity some business students expressed when being taught design thinking where they responded it was similar to other approaches they already used. EI_5 stated:

And they didn’t call it design or design thinking but it was remarkably similar in a different intellectual root...it’s [design thinking] just a slightly different approach to something that’s been around for quite a long time (p.1).

This suggests design thinking as being new labeling for existing approaches. To date there remains little questioning or investigation in regard to the disciplines and domains design thinking draws from. In addition, it is unclear how design thinking is different from a number of other activities or approaches (Badke-Schaub, Roozenburg & Cardoso, 2010). As a result, the majority of the literature presents design thinking

idealistically, discussing processes and methods or describing cases at a superficial level with little critical inquiry into the approach. This portrays design thinking from a narrow perspective, and primarily from only the perspective of the design discipline (see 2.1.3). In light of this it raises questions regarding the depth and scope of design thinking or if it simply provides a frame for a human centred and multidisciplinary approach to problem solving that is underpinned by design.

5.1.3 People understand design thinking through the lens of their own experience

There is a lack of clear differentiation between design thinking and a number of other design approaches. Participants in the Expert Interview and Second Road studies were briefed that the phenomenon under investigation was design thinking. Throughout interviews however the majority of participants fell into familiar language patterns based on their own experience and disciplinary base, using terms such as service design, customer experience, participatory design, user centred design or simply design. Only a minority retained the language of 'design thinking' throughout. Through this choice in language it was evident participants viewed design thinking through the lens of their own experience, integrating aspects into their practice. When questioned about the difference between their experience or practice and design thinking specifically, participants often struggled to answer. For some, there was no differentiation between design and design thinking. This was evidenced by EI_7 stating: 'in my own work and practice I wouldn't see any difference between designing and design thinking' (p.5). For this participant, design thinking was so wholly integrated into their work practice and worldview it resulted in design thinking being equated to design. Most however indicated design thinking as the approach and mindset, and their discipline represented the skill set and tools.

While a portion of the literature acknowledges a number of mindsets as being a critical component to design thinking, they do not acknowledge design thinking as the

mindset itself. Rather, the literature remains largely focused on design thinking at the approach level. For example, although Fraser (2012) advocates the need to begin design thinking with the right mindset and then apply the appropriate processes and tools, the focus of her work then describes how to use tools in practice with little emphasis on the mindsets involved. Study findings of participants' considerations of design thinking as mindset results in individuals interpreting design thinking through their own disciplinary lens. This then compounds the definitional complexity of design thinking as people characterise attributes more appropriately associated with other disciplines to design thinking. Further research into if design thinking can be differentiated from other design disciplines and if so what the differentiating factors are would be beneficial to better understand its relationship to these disciplines and its comparative value proposition.

5.1.4 The aspiration is more important than the definition

Overall, it emerged from findings that participants felt most strongly that design thinking denotes a significant paradigm shift occurring in business toward more human centred approaches. For several participants, it was this aspiration of design thinking that was most meaningful believing it would outlast the term itself (EI_2, EI_14, EI_3, SR_4, SR_6). One respondent noted: 'the term design thinking is just the tiny management fad of the moment that is just signifying a bigger thing going on' (SR_3, p.8). They further discussed this as the rise of the post modern organisation concerned with developing a different relationship between people and organisations. It was felt that as long as the 'humanistic perspective toward business' (SR_4) continues, the labeling for this, whether it be design thinking or another naming, did not matter (SR_4, SR_6). This was summarised by EI_14: 'the name might be out of date in ten years...but the way of thinking definitely will be incorporated more and more into all the different disciplines' (p.12).

This further indicates participants from the Expert Interview and Second Road studies equate design thinking with a mindset (as per 5.1.3). Extending upon this, participants demonstrated their concern for ensuring the longevity of the human centred and empathic focus, rather than preserving terminology. Within the literature Brown (2009) also highlights this sentiment, however maintains the naming of design thinking, expressing a belief that design thinking specifically can be integrated across all aspects of business and society. This orientation is limited within the literature, with most purporting a process and tool orientation. For example where Holloway (2009) discusses optimising the process of design thinking for maximum success. Participants are more concerned with what design thinking stands for rather than its naming or definition, which raises the question if a common understanding is actually needed.

Summary

This section has presented research findings for the category, understanding design thinking, which demonstrates the complexity of defining and understanding design thinking. Concerns regarding naming, as well as the desire for a common understanding were raised. It emerged this may be related to design thinking being a new labeling for an integration of existing approaches. This adds to the challenge in defining it as the differentiating factors of design thinking from other existing disciplines such as human centred design are unclear.. Despite discussions surrounding the definition and naming of design thinking however it emerged many participants were more concerned with the paradigm shift toward a more human centred and empathic focus it represents. Participant's understanding of design thinking influenced their perspective on it and how they applied it in practice.

5.2 Perspectives of design thinking

This section presents participant perspectives on design thinking. Two stances emerged, one of design thinking as a way of life and one as a way of work. The former

is aligned with how people behave and interact in the world. It acknowledges that design thinking is innately human which also results in difficulty differentiating design thinking from the individual. In relation to literature it is more associated with design thinking as a general theory of design. In comparison, design thinking as a way of work is concerned with its practical application. It was found this tactical focus views design thinking as just another approach for solving problems and innovation. This view aligns with the majority of the literature within the discourse of design thinking as an organisational resource. Findings demonstrate that an individual's orientation impacts on their understanding and in turn practice.

In addition, this category indicates the two perspectives are not mutually exclusive. Design thinking as a way of work is a subset of design thinking as a way of life. In this way it indicates a scale of maturity where individuals commence with the perspective of design thinking as a way of work and can mature into the view of design thinking as a way of life. Findings reveal that Expert Interview and Second Road participants display a preference for design thinking as a way of life. Deloitte however, are inclined to view design thinking as a way of work. The literature is also oriented toward the way of work perspective overall.

5.2.1 Design thinking as a way of life

This perspective of design thinking as a way of life understands design thinking from a human stance considering it a way of thinking, a mindset, disposition, worldview or simply as human. This stance acts as a guide for how individuals engage with the world. This was the primary perspective within the Expert Interviews and Second Road studies.

Design thinking was discussed as being innately human, another quality of design thinking as a way of life. This manifested in two ways within findings. First, a number of participants referenced the notion that 'everybody designs' (Simon, 1969). Participants

however extended this to make a clear distinction that while design thinking is an inherent human attribute it does not equate to proficiency. For example one participant describes 'I think at one level it's [design thinking] just human...that's not the same as saying that therefore we're all innately equal or capable...just because I can run, does not mean I am a runner' (EI_11, p.9). This metaphor signifies that everybody can design is a different proposition to everybody can design well. There is some agreement evident within literature that discusses design capability development. For example, Horvath (2006) discusses design capabilities can be developed as per any other innate physical or mental human capability. However, it is often challenging due to its abstract nature and requires many years of focused learning and practice. This implies that while design thinking may be instinctive, individuals must invest in developing it to reach competency.

Second, it emerged it can be difficult to differentiate design thinking from the individual. This was particularly strong for Second Road participants who discussed design thinking using language of human attributes rather than a conceptual standpoint. Design thinking is associated with how a person exists and behaves in the world: how they think, their disposition, their worldview and how they work. This challenge in differentiation is also apparent in the literature where design thinking is referred to as needing a particular attitude (Boland & Collopy, 2004), mindsets (Fraser, 2012; Stanford University, 2010), or sensibilities (Fulton Suri & Hendrix, 2010). For example Fraser (2012) discusses the criticality of the design mindset as the 'make or break' (p.20) ingredient in design thinking for successful design outcomes yet the focus of her work is on illuminating the process and tools.

This indicates an aspiration for there to be no differentiation between the method and the individual, it is simply how a person 'is'. This would represent maturity in design thinking where it is fully integrated into the design led professional's practices such that it is tacitly how they work in the world. However, the literature provides limited insight into how to develop these personal mindsets and dispositions, or indicate their

impact on design thinking in practice. Instead, while some literature implies this perspective of design thinking as a way of life, most present it from the perspective of design thinking as a way of work.

5.2.2 Design thinking as a way of work

This perspective of design thinking as a way of work views design thinking as a method, taking a structured and action oriented stance. It understands design thinking at a tactical and practical level considering it a tool, process, approach, discipline or practice. This perspective was dominant in the Deloitte study, and also apparent in aspects of Expert Interview participant responses.

First, at Deloitte design thinking was initially tagged by executive leadership as a practice, stating:

Design thinking is more than a process. It is a practice that offers the potential to unlock your creative power and ramp up your ability to innovate. Properly done, it will meet user needs and drive business success (DA_5, DA_artefact C).

Outside of executive leadership participants manifested a much lower tactical perspective of tool (DA_3, DA_22, DA_27, DA_36) or process (DA_16, DA_18, DA_22, DA_27, DA_28, DA_36). For example one respondent summarises: 'I see it as sort of being ... another tool we've got in the Deloitte tool kit for servicing clients' (DA_22, p.7). Some participants did however demonstrate the ability to consider it at varying tactical levels. For example, one participant discussed it as both a process and an approach:

For me design thinking is about this process but also a lack of process. So it's almost like an approach to how we solve problems and realising that a project is a problem to be solved (C28, p.1).

This demonstrates the organisation's vision for design thinking at a strategic level, compared to the reality of how individuals perceived it.

Overall, this tactical perspective views design thinking as a practical process oriented approach to reach a particular outcome. This indicates a lack of maturity in understanding the capability needed to practice design thinking and reach quality outcomes as it is more than the application of process and tools (see Chapter 6).. Within the literature, this perspective is the prevailing viewpoint due to its inherent focus on process and tools. It is particularly apparent within works attempting to make design thinking 'accessible and meaningful to managers' (Johansson-Skoldberg et al., 2013, p.128). For example the work of Liedtka and Ogilvie (2011) presents design thinking as a systematic process and set of tools for problem solving that can be applied by anyone. While this approach has good intentions, it represents a limited application of design thinking in practice as presented in the Deloitte case study which is explored further in Chapter 6.

This way of work perspective was a secondary consideration within the Expert Interview findings. Some participants acknowledged design thinking as a process (EI_10, EI_12, EI_14, EI_15). For example, one respondent noted: 'design thinking it's [sic] the process that you would use...to get to a final solution' (EI_15, p.1). Further to this it was also viewed as another naming for the design process more broadly (EI_10, EI_14) where one participant described design thinking as 'an interdisciplinary co-creative iterative process which is a design process' (EI_14, p.1). While this process aspect was recognised as a component of design thinking, overall the dominant perspective within this case was as a way of life. This indicates the two perspectives are not independent of one another.

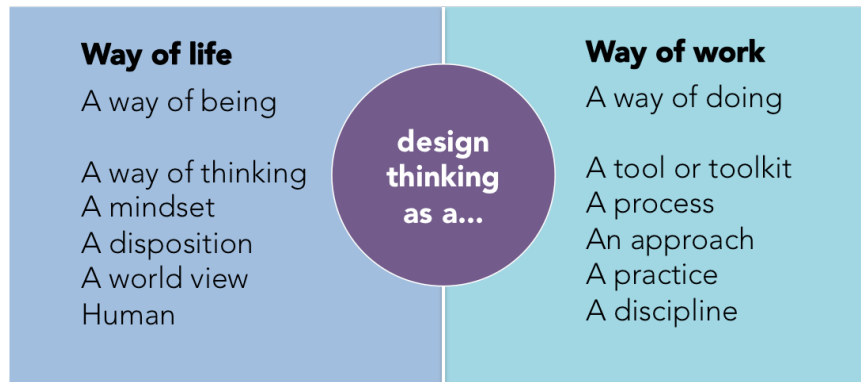


Figure 5.2: Two perspectives: design thinking as a way of life and a way of work using participant descriptors

5.2.3 Perspective as an indication of maturity

Design thinking as a way of life and as a way of work are not mutually exclusive. While all participants clearly favoured one perspective over another, many mentioned two or more aspects belonging to both (see Figure 5.2). For example one participant described design thinking as a mode of thinking, a school of thought, a discipline, process and world view all within a fragment of their interview (SR_8). This is also apparent in the literature where authors use varying descriptors. Evidenced in Brown's (2008) work he describes design thinking as a tool, methodology, approach and discipline within the same article (as also discussed in 2.1.3.2) This illustrates the difficulty in articulating design thinking, by design led professionals as well as those new to the concept, which adds to the challenge of creating a common understanding (see 5.1).

Further to this, participants whose orientation is toward design thinking as a way of life often discussed aspects from both perspectives. In comparison, those aligned with design thinking as a way of work only discussed aspects from within this view. As a result it can be surmised that design thinking as a way of work is a subset of design thinking as a way of life (see Figure 5.3). Considered linearly, the two perspectives indicate a scale of maturity of design thinking from a micro to macro level, from a way of doing to a way of being. For example Deloitte demonstrate a focus on process and

tools that could be a symptom of their infancy or alternatively their commercial orientation as a professional services firm where design thinking represents one set of method and tools for innovation. In comparison, participants from the Expert Interview and Second Road cases focus at a higher level on the mindsets and knowledge sets associated with applying a design thinking approach demonstrating a deeper understanding, significant experience and expertise of design thinking in practice (see Chapter 6). These indicate differing orientations as well as imply a progression of maturity from a way of work to way of life perspective.

An understanding of these two perspectives together is not explicit in the literature , instead works generally preference one perspective over another. Most of the literature, particularly from a business point of view, is aligned with design thinking as a way of work (for example Bell, 2008; Martin, 2009; Holloway, 2009). Authors from within the discourse of design thinking as a general theory of design (for example Buchanan, 1992; Owen, 2007; Simon, 1969) consider the potential for design thinking more broadly as a liberal art. In so doing they associate it as being human and a way of thinking and as such demonstrate preference toward the view of design thinking as a way of life. Some authors attempt headway at considering both, such as Fraser (2012) and Stanford University (2010) who make a distinction between mindsets and method, implying the two perspectives. However they do not go beyond this to explore the relationship between them. In addition, their overall messaging in both cases emphasises method. As such, the implications for how each perspective impacts in practice is unexplored in the literature. This is explored further in Chapter 6.

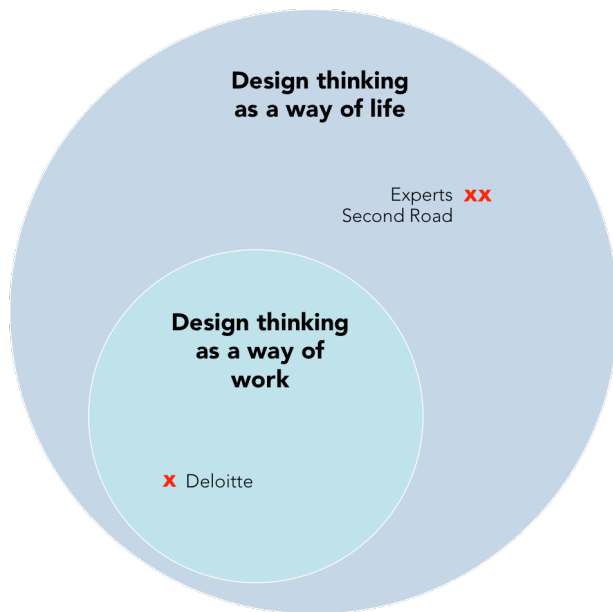


Figure 5.3: Design thinking as a way of life is inclusive of design thinking as a way of work

Summary

This section has discussed the research findings for the category, perspectives on design thinking. Two perspectives of design thinking as a way of life and a way of work emerged, as well as their interrelationship. Inherent within these perspectives is a scale of maturity in design thinking ranging from a way of work to a way of life. In particular, the literature focuses on a way of work as the dominant perspective. More investigation into design thinking as a way of life would be beneficial to further understand how an individual develops capability and matures to this perspective. ... These perspectives further emerged as an influence in participant perceptions of the purpose of design thinking.

5.3 Exploring the purpose and outcomes of design thinking

This section presents research findings and discussion exploring participant views on the purpose and outcomes of design thinking. This was not explicitly asked of

participants nor discussed at length in interviews yet naturally emerged. Overall participants displayed clarity in describing the purpose of design thinking as to solve problems yet with varying emphasizes in outcomes across the three studies toward problem solving for innovation or for navigating complex problems to create transformation. It was recognised however that transformation was more aspirational than practical with organisations primarily focused on innovation and competitive advantage. In the literature the purpose as problem solving for innovation and competitive advantage is emphasised, there are however opinions supported by limited cases heralding the value of design thinking for transformation.

5.3.1 Design thinking for problem solving

The primary purpose of design thinking is to solve problems. This was agreed upon across all three studies however with varying emphases toward either problem solving for innovation or navigating complex problems.

For Deloitte, the focus was on problem solving for innovation. Deloitte appropriated the work of Beckman and Barry (e.g. 2007; 2008; 2009) as the foundation for their construct of design thinking. For Deloitte it is 'a process for the practical, creative resolutions of problems' (DA_5, DA_artefact A) with priorities of innovation and business success through meeting user needs. . This is summarised by one participant: 'Design thinking to me is about tackling problems in a human centric way' (DA_1, p1). The widespread acceptance of this purpose was evidenced in several organisational artefacts and the majority of participant interviews (DA_1, DA_2, DA_3, DA_8, DA_14, DA_16, DA_17, DA_18, DA_19, DA_28, DA_35, DA_36, DA_FN 27 June 2011, DA_artefact A, DA_artefact B, DA_artefact C). It was unclear however if participants had developed this meaning for themselves or if it was rote learning.

Further, it appeared that participants connected primarily to design thinking as a way of working which allowed them to solve a problem or innovate. This innovation orientation seemed to take priority over user needs or the human centred aspect and

its potential to create change for people. This indicates the commercial orientation toward problem solving and solution creation was of higher priority than characteristic of human centredness.. This could be attributed to the cultural and commercial orientation environment of the organisation as a professional services firm where design thinking is one of many methods or to their infancy in design thinking.

However, problem solving for innovation is also the dominant purpose for design thinking present in the literature (see Bell, 2008; Cooper et al., 2009; Kimbell, 2011; Liedtka & Ogilvie, 2011; Lockwood, 2009; Martin, 2009). For example, Holloway (2009) referencing Martin (2009) and Brown (2008) respectively, describes design thinking as 'how designers typically approach problem solving' and concluding that the process ensures 'innovations are naturally balanced between the technical, business and human dimensions' (p.51). Further, authors with a more business focus, highlight the aspiration is to create competitive business advantage (for example Liedtka & Ogilvie, 2011; Martin, 2009). As Martin (2009) states: '...the firms that master it [design thinking] will gain a nearly inexhaustible, long-term business advantage' (p.7) yet provides negligible justification for this claim. This however provides insight into design thinking from a business viewpoint where the purpose is on the process of solving the problem to create something new within an organisation. This aligns with the perspective of design thinking as a way of work (see 5.2.2).

Navigating complex problems emerged as another purpose for design thinking. The majority of participants in the Expert Interview and Second Road studies identified this, suggesting design thinking provides a 'non traditional, non linear' (EI_3, p.1) approach to frame and navigate complex problems in order to solve them (EI_10, p.2). One participant believes design thinking is the only method for this stating:

I have a lot of evidence happening all over the world that the class of problems that challenge both governments, non profits and increasingly businesses are wicked problems, highly complex problems and that class of problem can really only be solved with design thinking (SR_6, p.8).

This appears idealistic however other participants provided insight into how design thinking assists in dealing with complexity. One respondent explained: 'the essence of

design thinking...is that a...complex problem and the potential solutions co-evolve...which means that you can tackle very fuzzy complex ill defined problems' (EI_2, p.1). This references the cognitive design thinking research of Dorst and Cross (2001) who found that when designers design they simultaneously work to understand the problem and develop solutions resulting in the problem and solution co-evolving. Buchanan (1992) also used the language of 'wicked problems', to argue design is well placed to solve these problems as the subject matter of design is universal. Applying this to business, Cooper et al.'s (2009) description of design thinking discusses its potential for reinventing business through solving their wicked problems.

While the sentiment of problem solving was common across the three studies, the emphasis on innovation or navigating complexity provides insight into participants' level of design thinking knowledge and experience. Those in their early learning phases, such as Deloitte, focus on the process aspect for problem solving and innovation. In comparison, those with a greater experience and expertise emphasise its ability to navigate complex situations and resolve them, as per the Expert Interview and Second Road studies. This distinction is consistent throughout the research findings.

5.3.2 Design thinking for transformation

One outcome of design thinking is to facilitate transformation. The majority of participants in the Expert Interview and Second Road studies believe the process itself as well as solutions developed should create positive change. Transformation commences with individual behaviour to then influence wider organisational culture. One participant explains:

'the actual key elements that we are molding to get the outcome is actually the people in the room - it's behaviour change...ultimately the only way to actually transform culture is to transform the behaviours of the people and the mindset...' (SR_10, p.41)

Another participant claims: 'if we really do the work right it requires them to change' (SR_4, p.5). These quotes recognise individual change and how it can ignite organisational change. This is exemplified by one participant's description of a project where they educated clients through a project that utilises design thinking to assist change in their organisation: 'I'm involved in helping them design the space and...the approaches that will help them make change happen within their organisations' (EI_4, p.4). Further, the result was often to foster a learning organisation: 'it's more about changing organisational structures and communication structures and employee empowerment so that they are really turning the organisation to the kind of learning organisation [in] that they are able to innovate themselves' (EI_14, p.11). These instances imply the design led professional enables individuals and organisations to innovate and ensure long term sustainable change through enacting roles as a facilitator and educator, guiding them as they learn through the process (see 6.2 which explores the roles of the design led professional further).

The value of design for such organisational change has been asserted for some time in the literature for the purpose of creating more human centred organisations (for example Buchanan, 2008). This is epitomised by Georges and Romme (2003) who argue for broadening organisational studies to design due its capacity to 'guide human beings in the process of shaping and developing their organisations toward more human, participative, and productive futures' (p.570). The case of the Australian Taxation Office provides an example of an attempt to use design thinking for organisational transformation to achieve these outcomes. Body (2008) overviews a program of individual behaviour change through conferences, training and experience with the goal of the Australian Taxation Office becoming a more service design led organisation over time. The results of this program in achieving this are however unclear. Overall, success stories of complex organisations using design thinking for organisational transformation, e.g. Proctor and Gamble (Fraser, 2012; Martin, 2009), continue to remain however in the minority.

A strong motivator apparent within the Expert Interview and Second Road studies was a belief that things can not only change and be different, but also better (EI_8, p.2). One participant discussed design thinking as a way of fixing organisations and how business operates:

‘to actually make things better is what design thinking I think is for....Like big business is broken...they don't know how to make things better, they only know how to make things more efficient based on what the person before them did...And so I think this design thinking...it's for fixing these broken organisations...because it's like a prescription for them’ (SR_1, p.1-2).

The prescription the participant refers to focuses on a desire to help people and impact positively and meaningfully. Two participants sum this up: ‘empowering people is what underpins design thinking at the root’ (SR_8, p.11) and ‘there is this sense of do goodness...it's around seeking the ultimate positive outcome’ (EI_3, p.3). This demonstrates an altruistic disposition of the design led professional to want to help people and ‘do good’ in the world. While this may be an underlying intention, if or how this impacts on outcomes is unclear and requires further research. The absence of this focus on affecting change in the Deloitte study can be attributed to their commercial orientation where their core business is more traditional consulting services, and their relative inexperience in understanding and applying design thinking.

While findings focus on the design led professional, there is also an indication of altruism at an organisational level within design thinking literature. The purpose however differs where altruistic initiatives within business are generally supported to leverage competitive advantage. This is exemplified by Fraser (2007) who praises the efforts of companies such as Dove for seeking to reframe the idea of beauty in its advertising and sponsoring altruistic programs to fight against media stereotyping of beauty. She goes on to imply how through understanding human needs deeply, which inspired Dove's initiatives, the organisation can use this to inform its strategy and expand its horizons. This altruism sells. As Parsey and Topp (2010) states regarding meaningful value: ‘It's not just altruistic - it also sells’ (p.44). This token altruism may

be sufficient for many design led professionals as regardless of final outcome, the human centred characteristic remains within the approach. This demonstrates potential tensions between the values and desired outcomes of the design led professional in comparison to organisations when applying design thinking. Where the design led professional may seek altruistic outcomes to positively impact peoples' lives, an organisation may desire to increase their competitive advantage through an appearance of or tokenistic attempt at altruism as per the Dove example. This presents a challenge for the design led professional where their aspiration for the outcome may differ from the realities of the outcome sought by an organisation in a project.

5.3.3 The aspiration versus the reality

As a result, while the aspiration for design thinking is transformation to improve peoples' lives, the reality is more aligned with problem solving for innovation and business advantage. It was evident all participants had been involved in successfully using design thinking for problem solving however the goal of transformation or affecting positive change was less apparent. Some had achieved individual behaviour change within projects yet there was no discussion or explicit evidence of affecting organisational transformation on a large scale. Many participants instead discussed being stymied by clients' preference for more traditional project deliverables despite pursuing design thinking. For example clients wanting problems solved yet without it requiring any organisational change (SR_4) or organisations unwilling to move beyond traditional analytical methods of business thinking and as such limiting solutions (SR_7). These obstructions could be due to tensions between the design led professional's view of design thinking compared to the client where it is often predominantly for the purpose of business advantage..

Where successful organisational change stories are described in the literature, they are often presented through new product development and profit (for example Fraser, 2012; Martin, 2009) rather than more human centred aspects of staff engagement or

product impact on customer well being. This demonstrates a preference in the literature and from broader industry to focus on business success through commercial gain, reporting on the direct outcomes of the method. In so doing, it highlights the perspective of design thinking as a way of work. In contrast, the desire for impacting positive change, and the altruistic disposition aligns more with design thinking as a way of life.

Summary

This section has discussed the research findings for the category, exploring the purpose and outcomes of design thinking. Two purposes of design thinking emerged of problem solving for innovation; and individual and/or organisational transformation to affect positive change. Further, underpinning this was a sense of altruism that manifested either as for commercial gain or to improve peoples' lives. It was found these purposes and outcomes aligned with perspectives of design thinking as a way of work and as a way of life respectively.

Orientation toward design thinking for innovation and commercial gain, which is the dominant view within the literature, represents a limited understanding of what design thinking can achieve and is impeding efforts to extend beyond this. Some claims are idealistic in declaring the potential of design thinking for transformation and affecting positive change yet recognise current endeavours are largely aspirational. More understanding and evidence of how design thinking can be used for large scale change is required. The characteristics of design thinking provide some insight into how this might occur.

5.4 Characteristics of design thinking

This section presents research findings and discussion exploring participants' understanding of the characteristics of design thinking. Within interviews across the

three studies participants were explicitly asked to name and discuss what they believed were the core values and characteristics of design thinking. Some were highlighted as a direct response to the question, others surfaced throughout the interviews. Through data analysis using the constant comparative method (see 3.2.5), five core characteristics were identified across all three cases yet with varying emphases and understanding: human centredness and empathy, collaboration, creative thinking, visualisation and prototyping. Further, three additional characteristics of holistic thinking, optimism and curiosity emerged as significant within the Expert Interview and Second Road studies. Finally, the literature also identified these characteristics among the most critical (see 2.2.2). Using an adaptation of Martin's (2009) framework of interpersonal, cognitive, attitudinal and methodological aspects (see 2.2.2.2), these facets contribute to developing a rich picture of the interrelated characteristics of design thinking.

5.4.1 Interpersonal characteristics

Within findings, interpersonal characteristics of human centredness and empathy; and collaboration are foundational to design thinking (see Figure 5.4). These characteristics, prioritised across all three studies highlight the focus of design thinking being conducted 'with' and 'for' people.

5.4.1.1 Human centredness and empathy

The characteristic of human centredness was the most significant in the Second Road and Deloitte studies, and prominent within the Expert Interview study. It is founded in the opinion that 'we're designing for people' (SR_2, p.8) and as such the process should be inclusive, representing all people the outcomes will impact. As one participant stated: 'it's user centric...user centred, people centred, customer centred, whatever...whoever uses the service, whoever is involved...should be included in the process of designing it also' (EI_12, p.2). This quote also illustrates the variety of language used by participants in discussing this characteristic invariably interchanging

between user (e.g. DA_1, DA_10, DA_14, DA_17, DA_22, DA_27, DA_28, EI_12), customer (e.g. DA_10, DA_14, DA_17, DA_18, DA_22, DA_25, DA_26, DA_28, DA_36, EI_12) or people (e.g. DA_18, DA_27, SR_2, EI_12). Regardless of language, the sentiment was consistent that people are at the centre of design thinking.

Aspect	Characteristic	Key literature	Expert Interview	Second Road	Deloitte
Interpersonal	Human centredness and empathy	70%	42%	69%	38%
	Collaboration	55%	42%	37%	10%
Cognitive	Creative thinking	60%	66%	50%	23%
	Holistic thinking	55%	33%	37%	
Attitudinal	Optimism	75%	50%	37%	
	Curiosity		38%	37%	
Methods	Visualisation	55%	58%	25%	10%
	Prototyping	60%	50%		

Indicates % of participants per study or estimated % in key literature that discuss characteristics. The darker the colour, the more mentions.

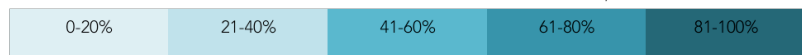


Figure 5.4: An overview of core design thinking characteristics within studies and within the key literature

One element of human centredness is empathy. However, whereas human centredness places people at the centre of design thinking as an activity, empathy exists within design thinking. Empathy seeks to deeply understand and assist the people design outcomes will impact. In this way, empathy is an enactment of human centredness. It was common for participants to discuss empathy using the analogy of putting themselves in the shoes of their customer or client (e.g. DA_1, DA_18, DA_25, DA_26). As one participant stated bringing the two characteristics together:

design thinking is about centring what you do and how you do it around the customer. So it's that empathy aspect of walking along in their moccasins and seeing how it feels (DA_6, p1).

The notion of empathy is further described by one participant through a metaphor of someone wanting to manufacture pens:

I'm really interested in pens but I talk to people and nobody really gives a shit about pens. I can't just say 'who cares I'm gonna do it anyway'... no you say 'well what was I caring about when I was caring about pens? I was caring about self expression...and then you find out how self expression is important to those people and what you can do to help them express themselves, because it wasn't pens that was the problem to begin with (SR_1, p5-6).

This demonstrates the need in design thinking to understand and put aside one's own bias and agenda to instead empathise with people, understand the underlying problem, and create a solution that satisfies others rather than oneself. While participants discussed empathy at a deeply human level, implying a genuine care for people in reality empathy occurred through conducting primary research with customers and clients. Empathising in practice then, is closely aligned with simply being human centred and understanding people and their situations through research rather than a more personal heartfelt understanding.

Similarly to findings, within the literature virtually the vast majority of descriptions of design thinking emphasise the characteristics of human centredness and empathy. Leidtka (2013) claims empathy in particular is a contribution design thinking makes to design, highlighting its absence from earlier design theories. Design thinking is presented as a 'people first approach' (Brown, 2008, p.87) focused on developing a deep understanding of people's perspectives and their needs which then informs solutions (Dunne & Martin, 2006; Lockwood, 2009). The literature primarily presents a methodological focus on these characteristics where research methods are used to understand people and their behaviour. For example ethnographic inspired approaches of observation, reflection and contextual inquiry to provide insight for new

business solutions and innovations (for example, Beckman & Barry, 2007; Dunne & Martin, 2006; Lockwood, 2009). In a minority of the literature empathy is presented as a mindset of design thinking, yet not further discussed (for example, Fraser, 2012; Stanford University, 2010). This demonstrates a divergence where empathy can be related to method or mindset in design thinking. However based on findings, it is apparent empathy is more an aspiration in mindset whereas human centredness is the reality in practice.

5.4.1.2 Collaboration

Collaboration emphasises designing 'with' people compared to characteristics of human centredness and empathy which focus on designing 'for' people. Stakeholder involvement in the design process was evident across all three studies, though it was not laboured upon by participants. Rather, particularly in the Expert Interview and Second Road studies, it presented as an assumption that collaboration was inherent within design thinking. As one participant clearly stated: 'design, it's a social activity...' Participants in these studies discussed several disciplines and methods that focused on participation and collaboration such as co-creation, co-design, participatory design, and user centred design, implying their relation to design thinking.

The Second Road project review provides an example of collaboration where a team of Second Road employees collaborated with a multidisciplinary team from the engineering firm. In addition, they collaborated with customers on varying aspects of the project. This mimics the broad scale of collaboration evident in the literature - between design led professionals, users and organisations (for example Blyth & Kimbell, 2011; Dunne & Martin, 2006; Dym et al., 2006; Fraser, 2009; Georges & Romme, 2003; Grefe, 2011; Kimbell, 2011; Lockwood, 2009; Owen, 2007; Terrey, 2010).

More specifically, multidisciplinary collaboration was a recurring characteristic discussed by participants. The purpose for this was to gain diverse perspectives to inform possible solutions. An example was provided by one participant:

we ran four workshops and each workshop had a different mix of people.

Because it's really important that you have different viewpoints...you just bring all those different types of thinkers together and if you don't have the different types of thinkers there might not be that much of a reason to do it (EI_9, p.6, 9).

The value of this was further articulated within one Deloitte Australia artefact:

'Remember that as each of us is better at certain styles of analysis and learning than others, you need multidisciplinary teams to analyse a problem to get the best results' (DA_artefact C). This was observed by the researcher within projects in Second Road and Deloitte where participants complementary skills and knowledge enhanced project processes and outcomes. In particular at Second Road project teams included at least one formally trained designer and one person from a liberal arts or business background to ensure a multidisciplinary balance of knowledge, skill and experience is applied to each project.

Within the literature, multidisciplinary teams were touted as necessary where teams reflected diverse perspectives and disciplinary backgrounds are required to holistically understand the problem and expand the range of ideas available (Dunne & Martin, 2006). The purpose for this focus is presented as due to the increasing complexity of problems faced by organisations in which the '*the lone creative genius*' is no longer sufficient (Brown, 2008). The literature describes the objectives for multidisciplinary teams as: to achieve sufficient divergent thinking to allow for radical ideas to emerge (Brown & Wyatt, 2010); for providing solutions to complex problems (Grefe, 2011); to allow participation and engagement from stakeholders to aid acceptance and commitment at the time of implementation (Georges & Romme, 2003); and for moving an organisation toward radical rather than incremental innovation (Lockwood,

2009). These reasons were not identified across findings despite the value of collaboration and multidisciplinary teams being espoused. Participants focused instead on the question of what the characteristics of design thinking were rather than why they were important which is a limitation of findings. Despite this, the identification of collaboration and multidisciplinary teams validates the literature presenting these as key elements. Further, this agreement across all cases and the literature signifies collaboration as present in both perspectives of design thinking as a way of work and way of life.

Owen (2007) claims these interpersonal characteristics are in particular a new component to the profile of design as design work expands to involve working within and across large multidisciplinary teams and with users. While there were subtle differences in meaning, overall a strong alignment between findings and the literature was apparent indicating the critical nature of the characteristics of human centredness and empathy, and collaboration to design thinking. These characteristics were the most significant and agreed upon across the four aspects.

5.4.2 Cognitive characteristics

Cognitive characteristics of creative thinking and holistic thinking also emerged as significant characteristics within design thinking. These characteristics highlight the inventive nature of design thinking and the need to understand a problem systemically in order to develop an appropriate solution.

5.4.2.1 Creative thinking

Creative thinking in particular was acknowledged as fundamental across all three studies where design thinking is dependent upon thinking and acting creatively for invention of new ideas and solutions. While creative thinking is synonymous with design, participants across all three studies took care to emphasise the characteristic and discuss its value. As one participant noted: 'design thinking is a...different

approach to thinking that offers opportunities for creativity and invention' (EI_8, p.1). From another participant: 'I do see it [design thinking] as a way of instilling creativity into the practical solutions of client's real problems' (DA_17, p.1). This creativity appreciates the human centred, environmental and contextual constraints within which invention must take place.

The literature supports findings. Creativity is recognised as foundational within the design thinking as a cognitive process discourse (for example Lawson, 2006; Rowe, 1987) and this tradition continues in current conceptions of design thinking. Rusk (in Lockwood, 2009) notes that creativity is the fundamental *thinking* underpinning design thinking with innovation and design the *doing*. Nussbaum (2011) agrees claiming the real deliverable of design thinking for business is creativity. He then goes on to assert that creativity is both the promise and downfall of design thinking where it provides design an opportunity to expand within the corporate world, yet instead was converted into a linear methodology. This removed much of the creativity from the approach, resulting in low success rates and incremental innovation at best (Nussbaum, 2011). These claims indicate an over reliance on design thinking as simply a creative process for innovation. Boland and Collopy (2004) warned against focusing on creative techniques over a design attitude stating that:

Design provides a context for creativity by channeling it toward humanly satisfying purposes, and that is why we cannot allow calls for increased creativity and techniques for enhancing creativity to take the place of increased attention to a design attitude in management practice and education (p.15).

This validates that while creativity is the goal, design thinking is the means through which creativity is channeled by design thinking to deliver innovation (Carlgren, 2013).

5.4.2.2 Holistic thinking

One characteristic which supports creativity is holistic thinking. Holistic thinking seeks to understand a problem at a systemic level and takes into consideration the larger context the problem is embedded within. One participant describes this as going beyond the small details and the problem itself to instead: 'on a kind of meta level...see the whole picture, the whole context. Try to be holistic' (EI_14, p.3-4). For one participant this notion is characterised as 'embracing the context' (SR_2, p.4). This is further described by another: 'you can only design within a fully experienced situation...So designers have to be able to put themselves into the role of the client, the customers, the user and the thing, the device, the world' (EI_6, p.7). This indicates a rich understanding of the problem and context is required in order to develop appropriate and sustainable solutions.

Despite the variance in language, findings of holistic thinking are consonant with discussions of systems thinking within the design thinking literature. Holistic thinking seeks the 'ultimate positive outcome' (EI_3, p.3) for people by considering the problem systemically. This aligns with the characteristic of human centredness and empathy; and the purpose of making peoples lives better. This sentiment is affiliated with the perspective of design thinking as a way of life as it was significant within the Expert Interview and Second Road studies, which identify with this orientation. It was not as evident within the Deloitte study, which aligns with design thinking as a way of work (see Figure 5.4). While it is perhaps unsurprising to uncover creativity and holistic thinking as key characteristics in design thinking, these findings provide insight into the constructs of the two orientations of design thinking as a way of life and a way of work.

5.4.3 Attitudinal characteristics

Attitudinal characteristics of optimism and curiosity emerged within findings as focusing on humanistic values of viewing problems as opportunities to improve people's lives and to critically understand people and the world.

5.4.3.1 Optimism

The characteristic of optimism surfaced as closely related to the purpose of affecting positive change and improving peoples' lives (see 5.3). Optimism manifested through viewing problems as opportunities to create new possibilities. This is described by several participants who view design thinking as the opportunity to envision and create new futures (SR_6; SR_5). One participant best exemplifies this:

I want the impossible because I want to actually show you that it can be possible...when I'm doing design my aim is to find the impossible situation with the optimistic goal of showing that if we imagine it we can make it happen (SR_2, p.3).

This demonstrates some participant's optimistic beliefs in the power and potential of design thinking to enable the creation of the impossible to improve people's lives. One participant brings this idea to the fore:

I'm always interested in the power and potential of design beyond its practice. And design thinking for me becomes a kind of name for this possibility. Design is what they currently do when they design, design thinking is everything else that design could be (EI_6, p.2-3).

In this way design thinking offers value in its approach and outcomes beyond the discipline of design in creating new futures (Simon, 1996). This view of optimism expressed in findings is consonant within the literature where it is considered inherent within design thinking (Brown & Wyatt, 2010). This is especially apparent within

Boland and Collopy's (2004) 'design attitude' concept for management thinking that they refer to as 'the expectations and orientations one brings to a design project' (p.9). They claim those with a design attitude view problems as new opportunities for invention with a resolve to improve future states (Boland & Collopy, 2004). This is summarised best by Simon's (1996) claim that design's desire is to 'change existing situations into preferred ones' (p.111). This indicates that optimism is a mindset of design thinking (Fraser, 2012) and provides a foundation for imagining new futures regardless of the challenges, constraints or complexity of the problem.

A comfort with ambiguity also manifested within the characteristic of optimism, particularly related to navigating complexity. One participant EI_2 sums this up:

What I do a lot is...to bring structure to very complex issues by cutting it down in individual models. I don't know the solution yet but the problem looks a bit like 'this' (EI_2, p.4).

Another participant described this as 'translation', where design thinking translates complex problems to people in ways that are understandable and seem achievable without over simplifying the situation (EI_9, p.2). The literature agrees that optimism is why design led professionals are 'comfortable wading into complexity without knowing what is on the other side' (Martin, 2009, p.159). Often the design led professional does not know what will be achieved from their efforts, nor define the steps required to get there yet have the belief that regardless of the context or constraints there is always a possible solution better than existing alternatives (Brown, 2008).

5.4.3.2 Curiosity

In addition, it was found that curiosity is one characteristic that fuels optimism. It is concerned with critically understanding people and the world. This often presented in participants as an intense attentiveness and observation of people and their

environment to appreciate the situation and sufficiently meet people's needs (EI_7, p.9; EI_3, p.5). One participant describes this curiosity as:

the capacity to ask why in a productive way, not in a nagging or nuisance way but to do it constructively and to bring insight and so forth, that's a capacity that undoubtedly goes with a more...design thinking capability (EI_11, p.4).

This occurs at the micro and meta level where it relates to understanding each person, the organisational environment and the world more broadly (EI_5, p.5; EI_7, p.4).

Curiosity is also closely related to the characteristic of human centredness and empathy due to its concentration on understanding people. While the literature does not explicitly acknowledge curiosity as a characteristic it often arises within discussions of empathy. For example, in Brown's (2008) description of empathy in his profile of a design thinker he states: 'Great design thinkers observe the world in minute detail. They notice things that others do not and use their insights to inspire innovation' (p.86). Curiosity then assists to fuel empathy and in turn this motivation of needing to understand as well as desire to help people inspires creative solutions.

In contrast to interpersonal and cognitive characteristics, the attitudinal characteristics of optimism and curiosity are more dispositional rather than skill based. As a result they are often discussed in terms of being associated with the design led professional rather than the approach. In doing so, this aligns with the perspective of design thinking as a way of life. This is supported by findings as these characteristics are significant within the Expert Interview and Second Road findings and notably absent from the Deloitte study. It can be speculated this omission could be attributed to the way of work orientation of the organisation where attitudinal aspects may not be recognised as important. In addition, it could be a reflection of Deloitte's design thinking maturity instead where they had not yet developed an understanding of these

aspects. Further understanding of the role and impact of these attitudinal aspects on practice and outcomes would be beneficial.

5.4.4 Characteristics related to methods

Two characteristics of design thinking evident across all three studies correlate directly to design methods of visualisation and prototyping. While these were identified as two separate characteristics, prototyping is one exponent of visualisation. This was particularly evident in the Second Road study where there was no differentiation between visualisation and prototyping and the former is inclusive of the latter. For participants visualisation and prototyping was medium agnostic. Some media mentioned and observed included sketching (EI_2, EI_5), videos (EI_2), storytelling, (EI_2), creating models, developing maps (EI_9) and role playing.

Visualisation was used by participants to assist in communicating complex ideas and problems, and in doing so assist in their comprehension. One participant summarises:

Visual thinking, the use of metaphors, the use of storytelling is important simply because it's dealing with life...and dealing with complexity in a human way. We make sense of things by telling stories about them, by creating metaphors, by creating visual models and that's a good way of making sense of complexity (EI_2, p.3).

Further visualisation is used to document thinking for the purpose of advancement and iteration. As one participant stated:

[it] is the ability to...picture in your head something that doesn't exist and actually be able to bring that to life either through storytelling or through sketches...and you start drawing it and people just start actually sharing that mental picture with you (SR_3, p.6).

The purpose of visualisation then is to learn individually and collaboratively, and to advance discussion and design. Prototyping is one expression of this concerned with the 'relentless' envisaging, testing and iteration of solutions (EI_2, EI_5, EI_6, EI_7). The role of failure is also incorporated in this as one participant noted:

prototyping I think is...one of the most powerful things that design thinking brings, is that...ability to understand the role of failure to test things, to try it out (EI_7, p.4).

In this way prototyping is closely linked to characteristics of creative thinking (to envisage and iterate solutions) and curiosity (in testing how a solution works in practice).

Visualisation and prototyping are synonymous with design. The function of these characteristics in design thinking is for communication and learning (Liedtka, 2013). This extends upon traditional notions of their use where design disciplines such as product and industrial design have focused on refined models and prototypes to display or sell designs. Design thinking broadens the media used in visualisation and prototyping, also evidenced in findings, to include low fidelity media such as role plays, storyboards, sketches or other form of concept visualisation (for example Boland & Collopy, 2004; Brown & Wyatt, 2010; Carr, Halliday, King, Liedtka, & Lockwood, 2010; Cross, 2006; Dunne & Martin, 2006; Fraser, 2009; Inns, 2013; Kimbell, 2011; Liedtka, 2013; Liedtka & Ogilvie, 2011; Lockwood, 2009; Owen, 2007; Terrey, 2010).

Within design thinking, visualisation and prototyping are used throughout the process for ongoing experimentation and testing of understanding, ideas and solutions. Fraser (2007) describes this as: 'the prototyping process becomes a "thinking and communication tool" for making the abstract concrete and stimulating productive dialogue within business teams and with users' (p.70). This feedback and discussion

accelerates learning of the problem from all perspectives which then allows for iteration and advancement (Lockwood, 2009). Findings and the literature extend upon the traditional foundation of visualisation and prototyping in design through the contribution of using these characteristics for learning and communicating complexity.

The characteristics of visualisation and prototyping related to design thinking methods were evident across all three studies. While visualisation was not significantly emphasised by Second Road participants as a characteristic (as reflected in Figure 5.8), it should be noted it was instead heavily discussed as a process (see 6.1.2.2). Therefore, Second Road do believe in the value of visualisation in design thinking however it is manifested in practice rather than the meaning of design thinking. In contrast, As Deloitte participants come from diverse disciplinary backgrounds that often do not encourage nor value visualisation they have little affiliation with it in their everyday practices. This is reflected in how little they associate visualisation with design thinking (see Figure 5.4).

5.4.5 Characteristics in relation to perspectives of a way of life and a way of work

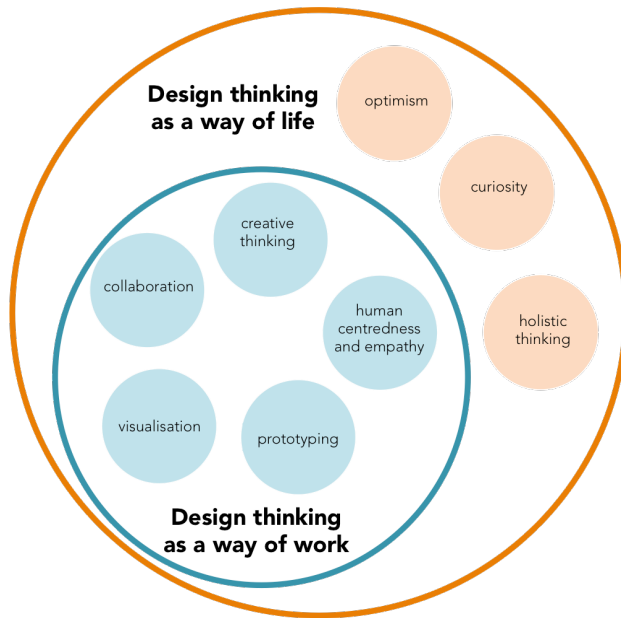


Figure 5.5: Characteristics of design thinking as they relate to the two perspectives of a way of life and way of work.

Variations in findings highlight differences between design thinking as a way of life and as a way of work (see Figure 5.5). Five characteristics of: human centredness and empathy, collaboration, creative thinking, visualisation and prototyping were common across all three studies and as such deemed significant across both perspectives. Three additional characteristics of optimism, curiosity and holistic thinking were further evident within the Expert Interview and Second Road studies only. As these studies are aligned with the perspective of design thinking as a way of life it was determined these are unique to this orientation. This provides further insight into the variation between the two orientations and possible implications for practice.

The Deloitte study aligns with the perspective of design thinking as a way of work. Within this study only two characteristics were significantly highlighted of human

centredness and empathy; and creative thinking (see Figure 5.4). There was limited acknowledgement of collaboration and visualisation and no attitudinal characteristics. This provides some insight into the novice understanding of design thinking, and the characteristics attributed to it within the way of work perspective. It views design thinking from a base viewpoint of putting people at the centre of the design thinking process and using creative thinking to innovate and solve problems. Collaboration and visualisation are used discretely to support elements of the process, rather than as core components. This could be attributed to Deloitte integrating design thinking into their existing ways of working where it is an additional approach rather than their primary way of working.

In comparison, Expert Interview and Second Road studies align with the perspective of design thinking as a way of life. The understanding expressed in findings of the five shared characteristics of human centredness and empathy, collaboration, creative thinking, visualisation and prototyping is more sophisticated. Nuances were highlighted that were not evident within the Deloitte study such as the assumption of collaboration between all stakeholders as part of design thinking (see 5.4.1). Further, three additional characteristics were evident within these cases of optimism, curiosity and holistic thinking. Through their sentiment of being deeply humanistic and worldly, these characteristics are closely aligned with the purpose of design thinking for transformation and improving peoples' lives. This demonstrates a depth and complexity of characteristics that develops with maturity in design thinking. Individuals and organisations represented in these studies are committed to design thinking as their primary practice. It is logical then that their perspective on design thinking is as a way of life.

Differentiating characteristics of design thinking from the design led professional further divided cases. In so doing it strengthened growing representations of the two varying perspectives. Participant responses from the Expert Interview and Second Road studies attributed design thinking characteristics primarily to the design led

professional. There was an acknowledgement that all four aspects of interpersonal, attitudinal, cognitive and method characteristics were crucial to the design led professional where their experience, skills and knowledge played a significant role as well as their personal attributes. This suggests design thinking is indicative of a type of person as well as set of capabilities and skills (see 2.2.2.2). It was especially apparent in attitudinal aspects of curiosity and optimism, which by nature are human traits. This aligns with the view of design thinking as a way of life, which understands design thinking as a way of being including dispositions. In comparison Deloitte participants firmly used language attributing characteristics to design thinking as a way of work, rather than considering them to a person. The challenge of differentiation between characteristics related to the approach compared to the design led professional is also apparent in the literature. For example, Fraser (2009) discusses empathy and experimentalism as elements of the process of design thinking. In comparison, Brown (2008) attributes these same qualities to the design led professional. While Fraser and Brown advocate for the same characteristics, this demonstrates the two perspectives at play where their affiliation to the process or design led professional indicates their respective view of design thinking as a way of work and way of life.

Summary

This section has discussed the research findings for the category, characteristics of design thinking. It describes the eight core design thinking characteristics of human centredness and empathy; collaboration; creative thinking; holistic thinking; optimism; curiosity; visualisation and prototyping. It confirms the literature that design thinking requires a broad mix of interpersonal, cognitive, attitudinal and methodological characteristics. Further, it is recognised none of these elements are unique to design thinking, however it is when these are combined and understood together that design thinking emerges.

Further findings demonstrate differences between characteristics emergent within the two perspectives of design thinking as a way of work and a way of life. With a limited

awareness and understanding of characteristics, design as a way of work attributes characteristics to the approach. In comparison, design thinking as a way of life demonstrates a deep understanding of all characteristics is crucial, attributing them instead to the design led professional where their skills and knowledge played a significant role as well as their personal attributes. This has varying implications for execution in practice (see Chapter 6). This further assists in providing insight into the novice understanding of design thinking and how this develops in depth and complexity with maturity (see Chapter 7).

5.5 Chapter summary

This chapter presents findings and discussion in relation to dimensions of understanding design thinking. Findings highlight a detachment from the term design thinking and a desire for a common understanding of the concept. Following this two emergent perspectives across the literature and in industry were established of design thinking as a way of life and as a way of work were established. These perspectives provide a framework for understanding variations in findings across studies within categories of purpose and characteristics. Design thinking as a way of life was presented as comprehending design thinking holistically, yet understands some elements are aspirational. Design thinking as a way of work is subset of this, presenting a limited view of the concept with a narrower understanding of elements (see Figure 5.6).

Dimensions	Design thinking as a way of life	Design thinking as a way of work
Definition	Design thinking is a way of thinking that uses creativity and collaboration for the purpose of solving complex problems in a human centred way to affect positive change.	Design thinking is a human centred process that uses empathy and creativity for the purpose of problem solving and/ or innovation.
Purpose	Complex problem solving for positive transformation Improving peoples' lives Altruism	Problem solving for innovation Commercial gain Competitive advantage
Key characteristics	Human centredness and empathy Collaboration Creative thinking Visualisation Prototyping Optimism Curiosity Holistic thinking	Human centredness and empathy Collaboration Creative thinking Visualisation Prototyping

Figure 5.6: Summary of dimensions of design thinking within the two perspectives of design thinking as a way of life and way of work

These perspectives assist in developing an insight into maturity in design thinking. It is apparent the novice commences within a perspective of design thinking as a way of work and develops through to the more complex and mature perspective of design thinking as a way of life. How individuals develop and mature from one perspective toward the next however requires further investigation. The next chapter will build upon this and use findings within this theme to contextualise and explore the composition of design thinking in practice.

6 Applying design thinking in practice

6.0 Introduction

This chapter presents research findings and discussion of how design thinking is applied and enacted in practice. Three components emerged: the approach; the impact of the design led professional; and the environment within which design thinking is conducted. The approach in design thinking includes the process, procedures and tools used in practice. Further to this, when leading projects that utilise a design thinking approach, four core roles of the design led professional are identified: facilitator of the process; design lead; educator in design; and composer of the design experience. Finally, in considering the environment in which design thinking is conducted two aspects are highlighted: the impact of organisational culture on design thinking in practice; and establishing a creative and safe space to enable design thinking at the project level.

Overall findings present design thinking in practice as complex in its composition and execution. Each component is interrelated and interdependent, with a particular reliance on the design led professional to manage all aspects. The two perspectives of design thinking as a way of work and a way of life are also further explored in relation to how each impact on practice (see Chapter 5).

This chapter has three main sections. First the approach in design thinking is considered. Second the role of the design led professional is examined. Finally considerations for creating an environment conducive to design thinking will be explored. Each section is contextualised with appropriate literature to provide a theoretical base for the presentation and discussion of findings. When considered together categories and their constituent elements provide a rich picture of design thinking in practice.

6.1 The design thinking approach in practice

This section presents participant views and experiences of how they approach design thinking in practice. These elements emerged through interviews, and in some cases, observation and artefacts. The approach is the most discussed aspect of design thinking in the literature however there is little detailed exploration of how it is applied in a business context (Sobel & Groeger, 2012). Findings contribute to this discussion.

This section has three main sub-sections. First, findings relating to the design thinking process will be outlined. While the process appears standardised at a high level, there are nuances apparent particularly in the naming and language used for stages in the process. Second, procedures of conversation, visualisation and heuristics will be presented and how they underpin a design thinking approach. Third, the role of tools within design thinking will be explored including the need for the design led professional to develop a multidisciplinary toolkit that can be applied flexibly according to project circumstances was identified. Findings contribute to a more in-depth understanding of the design thinking approach and how it is enacted in practice.

This category also demonstrates varying emphases dependent upon the design led professionals' maturity. Findings expose that design thinking as a way of life is concerned with procedures and the capability of the design led professional to apply design thinking to encourage quality outcomes. In comparison, design thinking as a way of work is focused on a systematic process with an associated set of tools. Literature largely perpetuates the latter perspective through its presentation of ready to use process models and toolkits (see 2.2.1).

6.1.1 Outlining the design thinking process

This section presents research findings and discussion outlining the design thinking process. Across studies, participants were not directly questioned regarding the process. Instead findings are drawn from participant interview responses, researcher observation and organisational artefacts. It was found that while the number of stages and their labeling varied the underlying process was largely standard across findings and the literature. Common elements included research and insight, ideation, prototyping, implementation and delivery. Further, findings indicate that keeping the naming of stages simple and descriptive assists in comprehension and adoption of the process as it implicitly provides basic information into what each stage entails. Finally, there was varying emphases placed on process within the two perspectives of design thinking as a way of work compared to a way of life. Whereas the former focuses on the process itself, the latter is concerned with how the process is facilitated and conducted according to the needs of the client.

6.1.1.1 The design thinking process is standard

The design thinking process and phases within it are predominantly standard. Three common components emerged: research and insight, ideation and prototyping. The number and naming of stages however alters depending on the study where for example additional stages were identified in the Expert Interview study of implementation and delivery. Findings are consonant with the literature (for example Fraser 2009; Martin, 2009; Duncan & Breslin, 2009; Clark & Smith, 2010; Leidtka & Ogilvie, 2011) which also identify these process stages with varying emphases (see 2.2.1). In this way, findings largely serve to validate and confirm the literature with semantic differences of limited impact.

Processes identified within each case are overlaid with Brown's (2008) model of inspiration, ideation and implementation as an aid for comparison (this model was used for consistency purposes to align with the comparison of design thinking process

models in 2.2.1.1)(see Figure 6.1). This highlights the relationships and overlaps of processes and stages across studies.

Study	Brown (2008)	Expert Interviews	Second Road	Deloitte
Design thinking stages	Inspiration	Research & problem finding	Initial research	Empathy
			Customer research	
			Invention	Insight
	Ideation	Ideation	Prototyping	Divergent & convergent thinking
				Iterate
	Implementation	Implementation	Telling the story	
		Delivery & evaluation		

Figure 6.1: Comparison of design thinking processes across studies in comparison with (Brown, 2008).

Inspiration

The Inspiration phase consists of research and developing insights for the purpose of understanding and defining the problem (see 2.2.1). Terms used across studies for this phase included research and problem finding; initial research, customer research and invention; and empathy, insight and divergent and convergent thinking. These elements were often discussed as separate steps occurring sequentially or integrated together where research and insights co-evolved.

Research involves understanding the needs of the people impacted by the problem. This involved not only the client’s customers but also the client. With the client this often took the form of a meeting or workshop to create a shared understanding of the project and its scope. For example:

It [design thinking] starts with getting groups to come together and articulate a shared understanding of where they are today and what the vision is for where they want to go and what the gaps are (EI_4, p.4).

In regard to research with customers, participants in the Expert Interview and Second Road studies discussed conducting primary research which often included observation, interviews, or workshops.

Following data collection, insights are developed to understand the problem and the context. One participant described this as:

once data or information has been gathered...Insights can be generated, insights meaning you know a new piece of knowledge or understanding that goes beyond what we might have understood before (EI_8, p.5).

This is conducted through analysing the data in depth and from multiple perspectives.

Second Road provide a practical example of research and insight within the engineering firm project reviewed. Research consisted of initial research, which focused on understanding the current situation, and creating shared understanding of the problem through conducting interviews with key stakeholders and facilitated project team discussions and workshops. Following this, customer research was conducted which involved site visits and interviews with 17 customer and industry representatives to provide information into the challenges and opportunities the engineering firm and the wider marketplace were facing. Second Road's Invention phase covers aspects of both of Brown's (2008) Inspiration and Ideation stages (see Figure 6.1), where insights were captured from the research and then ideated. Developing insights from the research involved facilitated group discussions and workshops for the purpose of analysing and synthesizing the data with the full project team. Additional sessions with the Second Road team only supported these to

continue to develop the data into insights that could be used to improve the firm's client experience of the sales process (the goal of the project). This demonstrates the pragmatic empirical foundation of the design thinking process where a depth and breadth of data is collected then analysed to gain perspective on the problem.

Research and insights as the primary components of the Inspiration phase is mimicked in the literature (see 2.2.1). In line with findings, the literature considers this stage to collect data through qualitative research methods to then analyse, synthesise and identify insights in relation to the problem (for example, Brown, 2008, 2009; Fraser, 2012; Holloway, 2009; Martin, 2009). The most common differentiation in the literature is for this phase to be split in two stages: one that focuses on research and understanding the problem, and the other on determining insights and defining the problem (for example Bell, 2008; Clark & Smith, 2010; Duncan & Breslin, 2009; Dym et al., 2006; Stanford University, 2010). However, whether considered one stage or two, there is alignment in the sentiment. Overall an imbalance toward the Inspiration phase in the process was evident within the literature and findings. This demonstrates the inclination of design thinking to focus on the '*fuzzy front end*' (Sanders & Stappers, 2008) of innovation and problem solving.

Ideation

The Ideation phase comprises the generation, development and testing of ideas that may lead to new solutions (Brown, 2008, 2009). Ideation was not laboured upon across the three studies, instead commonly understood as generating ideas. For example, within an organisational artefact in the Deloitte study, ideation was described as the need for several ideas:

Don't be content with the first solution you come up with, but fine tune it and incorporate additional information as it becomes available (DA_artefact C).

In particular participatory idea generation was emphasised across studies where project teams or stakeholders worked collaboratively, often in a workshop environment, to produce multiple solutions.

Prototyping follows ideation. Prototyping involves developing a limited number of solutions into tangible form for further development and testing (see 5.4.4).

Prototyping refers to a broad range of practices from a sketch, to a wireframe, a roleplay or a three dimensional mock up. One participant referred more specifically to 'rapid prototyping' and 'low-fi prototyping' (EI_6, p.1) in design thinking where prototypes are developed quickly and using low cost materials such as paper. The emphasis is on using prototyping for research and learning to further iterate solutions. This element then is cyclical, moving through prototyping, testing and iteration until the final solution is agreed upon. Prototyping was exemplified in the engineering firm project at Second Road. It involved the project team working with a former CEO, who acted in the role of client, to test a series of conversations. This allowed the team to test the prototypes and gain feedback in how to improve the conversation content and performance. This demonstrates one of the many forms solutions and prototypes can take.

In relation to the Ideation phase, literature focuses on turning insights into ideas (Brown, 2009); then prototyping and testing them for the purpose of deciding on a final solution (for example, Brown, 2008; Holloway, 2009; Stanford University, 2010). This is exemplified within a project described by Duncan and Breslin (2009) to examine the outpatient practice model at the Mayo Clinic. The project team created a life size prototype including exam rooms, medical staff areas and a waiting room from foam core material. All levels of hospital staff and patients were invited to tour the space as well as leave feedback via post-it notes in a gallery. This testing informed further concept designs which were tested again prior to implementation. The clinic clearly states that through live prototyping they have 'consistently learned more than through more structured questionnaires and focus groups' (Duncan & Breslin, 2009, p.17).

While ideation and prototyping practices are broad the purpose and overall practice of the Ideation phase between findings and the literature.

Implementation

In regard to the Inspiration and Ideation phases findings overall validated the literature rather than contributing significant new insight. It is in the Implementation aspects of the process where findings highlight the challenges of the implementation phase in practice and questions the role of implementation in design thinking. First, the Implementation phase is most fluid in its interpretation, referring to final outcomes, outputs or delivery (EI_3). This phase is also the least prevalent, only apparent within the Expert Interview study (EI_3, EI_4, EI_8, EI_9). Description of this phase was not laboured over with little discussion or detail of what this included, instead implying the solution was implemented and in so doing, signaling the end of the process. In comparison, Implementation was absent from within the Second Road and Deloitte studies, with their processes complete after prototyping and testing.

The literature demonstrates a similar imbalance in processes that do and do not include implementation phases (see 2.2.1.1). For example, Leidtka and Ogilvie's (2011) final stage 'What works?' concludes the process at prototyping and testing. It focuses on taking prototypes to market for customer testing. This then provides feedback as to whether the final investment for production or implementation is warranted. In comparison, Brown (2009) discusses Implementation as developing the best ideas into a 'concrete, fully conceived action plan' (p.64). For Brown and Wyatt (2010) this involves creating a communication strategy for internal and external stakeholders to communicate the outcomes and an implementation plan to provide practical strategies for introducing solutions and scaling them where needed.

Findings then are consistent with the literature in raising the question of where the design thinking process ends. This demonstrates a weakness, in the literature and in industry, regarding the understanding and application of design thinking which is heavily skewed toward the Inspiration and Ideation phases. The completion of work to

final implementation may be an issue (see 2.2.1.1). However, in the case of Expert Interview and Second Road studies, rather than a lack of capability, it could be a result of the nature of consulting work. First, this type of work requires considerable investment of time and therefore it is expensive to have consultants involved. Second, clients dictate project deliverables. The client may decide to undertake implementation themselves as they view it as a more traditional project management practice. Correspondingly at Deloitte, due to their commercial orientation it was evident from observation that design thinking was used for problem understanding and solution development. In this way, design thinking formed one component within a larger innovation process and was followed with project management processes for Implementation. From this, the value of using a design thinking approach within Implementation is questionable. Further exploration into the design thinking process is required to determine if Implementation is part of the process and what value it brings to this stage. This has implications for the expectations of design thinking in practice.

6.1.1.2 The impact of language on the process

While there is general consensus of the design thinking process across studies and the literature, each case presented phases with varying steps and language (see Figure 6.4). Findings indicate that inconsistencies in the use of language to name and describe each stage in the design thinking process impacts on how design thinking is understood and adopted.

Using simpler and more descriptive language to name each stage emerged as significant in aiding comprehension of the inherent purpose of each stage and influenced resulting practice. For example within the Expert Interview study, the primary language used to describe the first stage was Research and Problem Finding (EI_2, EI_3, EI_4, EI_6, EI_7, EI_8, EI_9). Research was conducted first, then Problem Finding to develop insights from the research and in so doing, 'find' the problem (EI_3, EI_4, and EI_8). Other terms used to describe these elements within the Expert

Interview study included *discovery* (EI_8), *analysis* (EI_9) and *immersive social research* (EI_6). This language indicates the activities associated with the phase.

In comparison, Deloitte named Empathy, Insight, and Divergent and Convergent Thinking within the first stage. Organisational artefacts described the latter two in esoteric terms and resulted in the concepts being difficult for staff to grasp what activities were required. For example, Insight referred to exploring a problem from multiple perspectives and involves 'moving from just focusing on the centre of an issue towards what is happening at the edges of the distribution curve' (DA_artefact C). Further, Divergent and Convergent Thinking was described as developing deeper insights through examining the unconventional and extreme ideas in addition to those more common (DA_artefact C 2011). It was evident this language for novices in design thinking was opaque and provides little guidance in how to apply the concepts. In practice, as a result, this language caused a barrier for some as they felt they did not have the knowledge or tools to achieve these expectations, and so did not attempt it. For others, while they adopted the terminology of these phases, in practice they had deviated from their meaning. It was evident participants instead followed similar patterns of Research and Problem Finding as expressed within the Expert Interview and Second Road studies (see 6.1.1.1). Keeping the language simple and descriptive aids comprehension for the lay person as it implicitly provides basic information into what the activities and expectations within each stage.

Within the literature the impact of the number of stages or language used to describe the process is indiscernible. This is significant as it has bearing on how individuals currently understand design thinking. Authors primarily present their version of the design thinking process with little explanation for how it was determined. The number of stages usually ranges between three and five and invariably includes some attempt at uniquely labeling each of these (see 2.2.1.1). Simplified language however is often a goal or product of design thinking to allow outcomes to be understandable and accessible. This can also be seen in attempts to use words and descriptions for the

design thinking process that is captivating, memorable and assists comprehension. For example, Brown (2008) uses three stages and alliteration to create a memorable process of Inspiration, Ideation and Implementation. In the same vein, Liedtka and Ogilvie (2011) use short but descriptive guiding questions to capture the approach of What is? What if? What wows? What now? Others use more traditional wording synonymous with the design process such as Clark and Smith (2010) from IBM who uses a five stage process of Understand, Observe, Conceptualise, Validate, and Implement (see Figure 2.2 for design thinking process model comparison). Most do aim toward using language that is descriptive to provide some insight into the purpose or activities within the stage. Regardless of the number of stages or language used to describe them, the underlying process in practice, as previously demonstrated in 2.2.1 and 6.1.1.1, is largely consistent. This is reminiscent of issues surrounding establishing a common understanding (see Chapter 5.1) where authors each have their own interpretation.

6.1.1.3 The influence of perspectives on process

The two perspectives of design thinking as a way of work or way of life impact on the emphasis placed on the design thinking process. Findings indicate that within the perspective of design thinking as a way of work, process is the anchor of design thinking. It provides stability and structure to an approach that seeks to resolve complex and often intangible challenges. Deloitte in particular was very process centric. This was influenced by their adoption of Beckman and Barry's (2008) design thinking process, which was repeatedly reinforced in standardised introductory presentations, workshops, and organisational artefacts. These artefacts included regular articles on the intranet (DA_artefact A, DA_artefact B) as well as a screen saver that was applied to all organisational computers espousing the process (DA_artefact D). Often the only exposure staff had to design thinking was through these artefacts. It is unsurprising then that the description and focus on the process was conclusive across interviews and observations with no variation. This steadfast focus on process indicated the organisation's early stages of embedding design thinking, where design

thinking was viewed as an addition to existing work practices rather than a replacement.

In comparison, Second Road and some participants from the Expert Interview studies took a broader view of the process, emphasising concerns regarding the complexity of execution and meeting the needs of the client (see 6.1.2 also). Within these two studies, despite direct questions there was little explicit discussion of the process they use. Instead, there was a general acknowledgement of it being similar to a typical design process (EI_3, EI_4, EI_8, SR_4, SR_5). Participants reflected particularly on the challenges of customising the process and activities to the needs of the client within organizational projects (SR_4). One participant described the intricacy of this, discussing the process is 'tailored to the culture, the individual, the organisation and the project' (EI_3, p.5). This presents the complex and sophisticated reality of design thinking where, while process stages may be evident at a high level, the sequencing and activities within each project are customised to the situation. Whereas design thinking as a way of work focuses on the process itself, design thinking as a way of life, as demonstrated within the Second Road and Expert Interview studies, is concerned with how the process is facilitated and conducted according to the needs of the client. This highlights a core characteristic of design thinking of being human centred (see 2.2.2.2), within the project but also in working with the client. While discussions of process are valuable at a high level to provide an overview of the approach, it does little to make transparent the depth of the process in practice.

A process centric view is dominant within the literature (see 2.2.1.1). This accentuates the perspective of design thinking as a way of work. One set of literature focuses on presenting the process of design thinking with a corresponding set of tools to use within each stage (for example, Curedale, 2013; Fraser, 2012; Liedtka & Ogilvie, 2011). This implies design thinking is systematic and sequential in execution and that anyone can achieve quality outcomes through following the provided framework. Another set of literature emphasises case studies of design thinking success yet often with little

detail and presented idealistically (for example Brown, 2009; Clark & Smith, 2010; Duncan & Breslin, 2009; Holloway, 2009). Both of these sets of literature remove the complexity of practice and nuances in execution as demonstrated in the Expert Interview and Second Road studies. In doing so it limits the understanding and potential of design thinking, preserving the dominant view of design thinking as a way of work.

Some writers raise concerns of the dilution and misrepresentation of design thinking (for example, Collins, 2013; Johansson-Skoldberg et al., 2013; Kimbell, 2012; Nussbaum, 2011). In so doing they allude to a view of design thinking as a way of life. Nussbaum (2011) highlighted the shallow conceptions of design thinking adopted by organisations arguing this led to it failing to live up to its potential. This provides insight into why there is critique within some literature and findings in regard to the naming, understanding and process centrality of design thinking (see 5.1). While opinions are raised, there is no discussion of the complexity in practice within literature as evident within findings in this research project.

Summary

This section has discussed research findings outlining the design thinking process. The design thinking process has been presented including emerging considerations related to the impact of language and influence of perspectives. Research findings present that while the number of stages and their naming may vary, the design thinking process across studies and the literature is largely congruent. Additionally, the language used in the naming of stages was found to contribute to understanding how the process was adopted.

Furthermore, research findings established how an individual's design thinking maturity and perspective influence the emphasis on process. Design thinking as a way of work was presented as process centric resulting in an understanding of design

thinking that was overly linear and systematic. This view is further perpetuated within the literature. In contrast design thinking as a way of life is somewhat indifferent to the process itself, instead concerned with the complexity of leading and executing the process according to the needs of the client. This is further explored in relation to understanding methods within design thinking.

6.1.2 Understanding procedures in design thinking

This section presents research findings and discussion outlining procedures in design thinking. Across cases, participants were asked to describe how they applied design thinking in practice. Findings are drawn from participant interview responses and project review artefacts. Consideration of methods arose only within the Expert Interview and Second Road cases. There was no discussion of methods within the Deloitte study and as a result this case does not feature in this section. This further contributes to developing the perspective of design thinking as a way of life where methods, rather than process and tools, are the focus.

This section will detail the three procedures of conversation, visualisation and heuristics which are interdependent and underpin design thinking as an approach. It was found that conversation provides the foundation for co-creation. Visualisation and heuristics stimulate and progress conversation and in doing so, design solutions. Findings contextualised with literature demonstrate a limited understanding of these procedures, individually or in combination, within the design thinking discourse.

6.1.2.1 Conversation for co-creation

Conversation is the core procedure that underpins design thinking. It is used for developing shared understanding and co-creation throughout projects (Conklin, 2005). Conversation emerged as central to applying design thinking within the Expert Interview study yet few specifically recognised or articulated it as a core component of their practice. For Second Road however, conversation is an espoused core procedure

in their practice (e.g. Golsby-Smith, 2007; Jenkins, 2010), which resulted in a strong emphasis throughout interviews and the project review. Engineering firm project documentation included artefacts from numerous facilitated conversations. While the proliferation and content of conversations was evident from the documentation, their purpose, facilitation and outcomes were not. These aspects were a primary focus in the group interview.

Within findings, conversation in design thinking emerged as a deliberate process of thinking and creating through talking with others in a communal environment (see 6.3 for further discussion on the environment in which design thinking is conducted). This was exemplified by one participant as: 'the process of thinking through topics and problems in a communal setting...organised and facilitated deliberately...leveraging the value of people doing it together' (SR_11, p.27). This is related to its use in design thinking and its ability to progress design by another participant:

design thinking activate[s] or build[s] upon a particular set of conversational moves, strategies...there is this difference between small talk and mindfulness and the kinds of conversational moves that are required to progress a design exercise (EI_11, p.5).

Conversation in design thinking then is strategic and purposeful to encourage progress. While conversation was the preferred term, it did not align with all participants. Golsby-Smith (2007) terms these goal oriented conversations as 'strategic conversations'. Other participants indicated their preference for the word dialogue as it portrays a more formal and rigorous concept than conversation. As one participant described:

dialogue is like the word design...everything we do is a form of dialogue but it's a specific form of dialogue, it's an applied dialogue. It's a focused dialogue. It

takes quite a bit of rigour in comparison...it's not like coffee chat dialogue (EI_12, p.8).

Regardless of language preference the sentiment is consistent. This demonstrates that conversation within this context is more than its informal colloquial understanding. It is an organised, deliberate and intentional method to bring people together to collectively think through topics and create new knowledge to progress outcomes.

The discussion of conversation in design thinking within the literature is negligible. Some recognition exists however within the design thinking as a cognitive process discourse and broader design literature. In particular Lawson (2006) discusses the role of conversation highlighting that design progresses 'partly through the conversations between team members' (p.265). This was also asserted by Boland and Collopy (2004) who suggest that to achieve a good solution to a design problem 'dialogue among the actors in the design process is usually required, if not to develop the design ideas, then to explore dimensions of the best alternative' (p.270). Lawson (2006) goes on to propose these conversations are often unrecorded in the design process and as a result their role underestimated, noting further this was an underexplored area in design research. Instead the role of conversation or dialogue is more often implied through descriptions of the design thinking approach or process. For example, collaboration is a core characteristic of design thinking (see 5.4.1) and participatory workshops are a common feature within projects (for example, Brown, 2009) both of which imply people working together through conversation. Conversation however is only implicitly recognised as a procedure through which these activities are achieved. These findings explicitly establish conversation as a procedure in design thinking for co-creation.

Co-creation is used in design thinking to create shared meaning and ownership of ideas and outcomes (Lawson, 2006; SR_5; SR_6). A participant discusses how creating this shared meaning and vision within groups can drive this:

conversation is a critical component of design thinking because if you don't have conversation, that vision of the future is not shared. It's never as powerful when articulated or advocated by one person as it is when it's co-created by a group of people. The larger that group of people the more energy it creates and the more momentum it creates for change...so our conversation is an enabler, a critical component of...design thinking (SR_6, p.3).

While the 'vision of the future' can be shared in a number of ways such as a visually and materially along with conversation, it is evident that conversation is seen as the critical method for this. The role of the design led professional in ensuring this co-creation of ideas and sense of ownership is discussed by another participant:

The number 1 challenge is...actually to get momentum within the organisation so what Second Road brings is the ability to run a conversation where it feels...for everyone who's sitting in that room, that they actually contributed to the crafting of this idea...that now feels shared and I have a sense of ownership over it and therefore I'm going to help this thing come to life (SR_3, p.5).

This implies the co-creating process is one of inquiry, learning and creation through conversation.

Conversation then, engenders both action in the co-creation of vision and solutions; as well as emotion in the sense of achievement, ownership, and empowerment. It develops engagement and achieves momentum for change. Through this combination of action and emotion, the goal of co-creation is transformation of the organisation and/or the individual. This sentiment is particularly aligned with the perspective of design thinking as a way of life; and the purpose of design thinking for transformation and creating positive change (see 5.3). This demonstrates that the design led professional's prevailing perspective of design thinking influences their practice.

The sentiment of conversation is alluded to within a limited selection of the design thinking as a cognitive process literature. For design thinking, conversation is more than a means for communication but also a method for co-creation (Owen, 2007). Lawson (2006) describes two types of conversation that occur within the design process. The first is of narrative conversation where storytelling is used for context setting or moving through a situation. The second is negotiation conversations to develop shared meanings, resolve conflicts and negotiate between the problem and solution view of the design situation. These ideas marry with findings that demonstrate conversation aids co-creation in navigating through the design process; and negotiating and making decisions throughout regarding ideas and solutions. Dubberly and Pangaro (2009) extends this claiming an effective conversation results in changes of lasting value to participants such as making decisions, holding new beliefs or developing new relationships. This aligns with the goal of transformation through conversation, which may manifest in many forms of lasting value for the individual or the organisation. In summary while conversation for co-creation is not unique to design thinking, there is however limited literature that considers the role and impact of conversation within design broadly let alone specifically within design thinking. Further investigation is warranted due to its criticality to the approach for as Lawson (2006) identified its role within design remains underestimated.

6.1.2.2 Visualisation for sensemaking and negotiation

Visualisation is considered more than a characteristic of design thinking (see 5.4) but also a procedure, recognised by the majority of participants across the Expert Interview and Second Road studies. This includes a broad range of techniques and resulting artefacts that are primarily low fidelity such as drawings, sketches, built models, role plays and stories (SR_1, SR_2, SR_3, SR_4). This was evidenced within the Second Road project review where documentation comprised a proliferation of concept maps documenting conversations, photographs of activities and events, concept sketches at various stages, final rendered models, and videos. It is recognised visualisation is not unique to design thinking, rather instead is synonymous with design

and creativity more broadly (see 5.4). However, findings indicate visualisation in design thinking is less concerned with the artefact itself but instead the conversation the artefact facilitates. This differs from the more traditional communication focus of visualisation in design (see 5.4).

Visualisation was found to be critical as a method for sensemaking complex problems. One participant provides an example of complex systems as abstruse and how visualisation assists in understanding them:

it's really hard when you're working on these very large abstract systems such as people's behaviour around financial services... there are so many pieces, there are so many different people...you try to visualise the thing that you're going to be manipulating and trying to understand it as completely as possible (SR_1, p.6).

Thus, visualisation, through providing a tangible representation of abstract and conceptual ideas, aids the process of understanding complexity. It also assists in gaining a holistic view and understanding of a problem and all its component parts (which relates to the characteristic of holistic thinking, see 5.4.4)

Visualisation progresses conversation, and in so doing the design process, through providing a tangible form of ideas to negotiate. One participant described that visualisation provides: 'a focal point for conversation...but also getting things out of people's heads you know ... that ability to actually realise an idea in terms of something that's actionable' (EI_7, p4-5). This was further elaborated on by another participant who discussed the purpose of visualising as:

externalising something from the mind of an individual to become the property of the group so by turning it into some sort of physical form it then becomes something that everybody can share and contribute to and have some ownership of rather than just one individual's idea (SR_10, p.34).

In this way, visualising ideas provides a focal point for conversation, aiding collaboration and creation of shared meaning and collective ownership of concepts. Further to this, visualising ideas and concurrently discussing them progresses their iteration. As one participant described:

It allows you to iterate and it's sort of like stupidly fast prototyping...as soon as you form something in a mark it accords with people or it just discords with people and then you find out why and...that allows you to move forward (SR_10, p.34-35).

This suggests that further to aiding progression of the conversation that visualisation accelerates the design process.

Using visualisation to navigate complex problems is alluded to in a limited portion of design research literature. Cross (2011) discusses an interview study by Davies in which it was found individual designers need to use visualisation due to the cognitive limit of complexity that an individual can handle at one time. Cross (2011) states 'sketching provides a temporary external store for tentative ideas, and supports the 'dialogue' that the designer has between problem and solution' (p.12). While this is in relation to an individual designer's process, the ideas are transferrable to collaborative design. Due to the complex nature of problems, external representations through visualisation can assist in providing individual clarity as well as shared understanding of the problem.

Findings also confirm sentiment in the broader design thinking literature that visualisation, through the sharing of representations, is fundamental to collaborative design activity (Cross, 2011). More specifically, Dym et al. (2006) found in their study of design thinking within engineering education that visualisation serves as an aid to analysis, communication and discussion which can hasten the development of ideas and concepts into successful design outcomes. In line with findings, Blyth and Kimbell (2011) more specifically accentuate how visualisation opens up a dialogue between

people to make sense of and use ideas. Findings and the literature agree the type of visual artefact is irrelevant but instead how visualisation activates, progresses and accelerates the conversation, and in turn the process, is most important (Blyth & Kimbell, 2011; Lawson, 2006; van Patter & Jones, 2013). Visualisation as a procedure within design thinking overall however is little recognised in the design thinking literature or how visualisation in the context of design thinking differs to other design disciplines. In addition, little is explicated in terms of its relationship to conversation. Findings contribute to commencing a discussion regarding the relationship between conversation and visualisation within design thinking.

6.1.2.3 Heuristics for stimulating conversation

Heuristics assist in understanding and exploring an unfamiliar situation. It provides a framework to assist in reasoning and decision making when information is limited (Gigerenzer & Gaissmaier, 2011). Heuristics include rules of thumb, metaphors or an educated guess (Casakin, 2007). Within architecture 'form follows function' is a famous heuristic where the 'external appearance of a building comes as a result of the building's internal use' (Casakin, 2007, p.22) and influenced a generation of architects in the Modern Movement. Within findings, the Second Road study provides an example of a heuristic was a metaphor frequently used of 'reader/author'. This metaphor was used to question and understand an individual or organisation's agency in a situation. If they felt they had agency to act and could influence the situation they could 'author' it. In contrast if they felt out of control and like the situation were happening to them, they were acting as a 'reader'. Heuristics were identified as the third procedure for design thinking within the Expert Interview (EI_2, p.4; EI_8, p.6; EI_11, p.5; EI_12, p.7) and Second Road (SR_4, SR_7, SR_11) studies.

While not as prominent as conversation or visualisation, being able to draw upon a set of heuristics was found to complement and support conversation and visualisation. Heuristics emerged as particularly pervasive within Second Road's practice. All participants used at least one heuristic within their interview to discuss content, even

if they did not discuss the concept of heuristics specifically. Within the project review, artefacts documented several heuristics used through the project. They were found to provide frameworks to stimulate conversation to progress a situation toward an outcome.

Heuristics provide a structure and anchor to understand ambiguous and intangible circumstances. They were described as '*content free frames for thinking*' (SR_7) in which information is input and in turn provides an account of the situation (SR_4) to stimulates a conversation. This was evidenced within an example of a heuristic used within the project review, titled the 'funnel of scope' (see Figure 6.2), to understand the project scope. Aspects of the problem were discussed and placed. This stimulated a conversation regarding what levels in the funnel of scope were within the project and which were beyond it. In so doing the project boundaries were determined. It additionally served as a reference to check they remained within the project scope at all times - during discussions, activities and ultimately outcomes. This heuristic provided a structured and visual framework for the project team to consider the aspects and levels of the problem and determine the project focus. While this was used for discussing scope in this scenario, the same heuristic could be applied to understanding any number of situations such as organisational hierarchies, levels of systems, or root cause analysis. One participant reflected on the value of heuristics within design thinking to progress the process:

a good facilitator who has a strong mastery over a large set of heuristics...can take what seemed like a kind of interesting idea and apply various heuristics to it and all of a sudden it breaks open a whole new space which can take things forward hugely (SR_11, p.30).

This elucidates the role of the design led professional in using this procedure where heuristics provide a tangible structure to consider various ideas. This information can then be reframed by the design led professional to encourage new ways of thinking

and progress design solutions. As another participant described: 'Heuristics are useful for explaining the way that we think about things. I think that they're also useful for helping our clients to understand the situations that they're in' (SR_4, p.6). Heuristics then provide a context agnostic set of tools that can be flexibly applied to any situation.

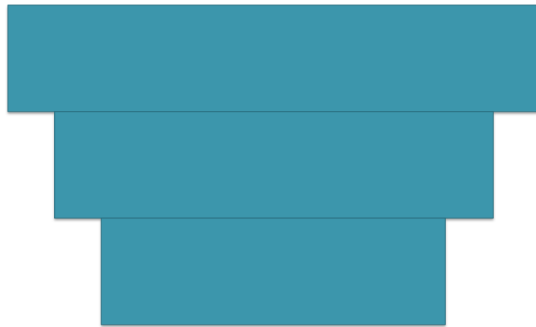


Figure 6.2: Funnel of scope heuristic

The use of heuristics in design is only generally acknowledged within pockets of broader design literature. It is most common within interaction design and human factors literature related to usability. Within this body of works heuristics are considered general design principles or guidelines for designing products (Nielsen, 1994). These heuristics also serve as an evaluation tool to determine how well a product meets the guidelines (Nielsen, 1994). Findings demonstrate divergence from this understanding and usage of heuristics and instead align with more recent literature presenting the use of heuristics more broadly in design. Casakin (2007) discusses that using heuristics enhances creativity as it enables one to 'perceive a problem from unorthodox and innovative perspectives' (p.21). His empirical work specifically focused on using metaphor as a heuristic to organise thinking, navigate complex design problems and reflect on the situation. He argues this results in new thinking that allows exploration beyond the initial problem constraints to consider novel alternatives. Findings confirm and extend this notion through introducing the flexibility and transferability of heuristics to any number of situations and contexts due to their content free construct.

Within the discourse of design thinking as an organisational resource more narrowly, the primary reference to heuristics is by Martin (2009) who names 'Heuristic' as one stage in his design thinking process. Martin (2009) uses the term to frame the second stage of the process, where it acts as 'a rule of thumb that helps narrow the field of inquiry and work the mystery down to a manageable size...It is a way of thinking about the mystery (a defined problem which forms the outcome of the first stage of design thinking) that provides a simplified understanding of it' (p.7-9). Martin (2010) discusses that heuristics provide an organised exploration of possibilities that guide the project team toward a solution. While the sentiment of the term is consistent between findings and Martin's work, the overall usage is divergent. Martin views Heuristic as a stage, setting it at a higher level, focusing on developing insights to generate ideas to inform a final solution. Within findings, heuristics are a procedure applied within any activity across all stages of the process as needed to understand the situation, reframe thinking and progress the project.

Overall, while there is some broad acknowledgement of heuristics in design research, there is little pertinent within the design thinking literature. Findings contribute a new understanding of the role of heuristics in design thinking. The use of heuristics as a procedure to understand a situation, stimulate conversation and progress a collaborative design process warrants further exploration.

6.1.2.4 The interdependent relationship between conversation, visualisation and heuristics

Conversation, visualisation and heuristics are interdependent procedures which underpin the approach of design thinking. Conversation and visualisation emerged as the two primary procedures, often discussed together, indicating their enmeshed nature in practice. Heuristics were highlighted as complementing these, applied as needed, dependent upon the situation at hand. How these marry in practice became illuminated throughout the Expert Interview and Second Road studies.

Combined, the three methods drive and expedite design thinking in projects (SR_5). Design activities used to progress projects were structured, based upon a foundation of conversation and supported by visualisation. Heuristics often formed the framework of the design activity, or at times used within activities to assist in navigating impediments to progress. Activities were carefully facilitated to stimulate conversation and required visualisation to provoke, support and evidence the discussion. The activities aid in learning and creating new knowledge to progress the project. One participant discusses how visualisation supports conversation, describing visualisation as the:

substantiated idea. It's the thing that you can actually point to and talk about. It's the externalised...memory rather than having an abstract concept that's floating around between us. We can put a handle on it, give it a tag, stick it somewhere, point to it and say that, that's the thing that holds the idea that we've been talking about (SR_11, p.34).

Visualisation provides a tangible representation of the conversation. Further, another participant gave an example of how visualisation can progress conversation and ideas in practice:

one group...I went up to them and they'd been arguing for like two hours, they hadn't managed to get round to it [visualising]. So it was like six people and...I did one sketch of what they were talking about ...and they all just went ahhh... And... what that meant ...was it brought them all on the same page and then the conversation was used to develop it... (EI_15, p.11).

In this example conversation was used to develop the idea. Using visualisation to create a tangible representation of the idea facilitated the group's understanding of it,

which in turn allowed the conversation to progress. This was further validated by several participants, including EI_4:

when you're learning and thinking and having conversations about things where you have to have a shared understanding of something it helps to have a picture or a model or some way to maybe act it out (EI_4, p.9).

This picture or model could be visualisation and/or a heuristic to progress understanding. Conversation then, married with visualisation and heuristics, facilitates understanding complex problems, sense making ideas and enables people to collaboratively create knowledge and solutions (SR_4).

While there is acknowledgement of the three methods individually within the literature as previously presented (see 6.1.2.1-6.1.2.3), there is none that considers the relationship between all three. Recognition of the connection between conversation and visualisation is however apparent within a limited portion of literature. Lawson (2006), within the design thinking as a cognitive process discourse, explicitly draws together the interdependency between conversation and visualisation within design thinking stating:

It matters not at all whether there are one or many designers, the process seems to be the same...the ideas are undoubtedly processed through concepts described in words. These words have enormous significance since they represent a complex set of characteristics some of which may help the designer to see a way of proceeding. The drawings appear to reveal problems and enable the designer to see unsatisfactory situations. Together these two powerful forces combine to make the very essence of design thinking (p.270).

This recognises the value of the procedures as well as the power of combining them. Conversation in this case is expressed through words, and visualisation through drawing. In this way, conversation and visualisation assist to view situations from a different perspective and determine a way of proceeding to create appropriate design solutions. This is extended by Boland and Collopy (2004) who claim the calibre of dialogue and argumentation supported by tangible artefacts contributes to the quality of ideas and design solutions.

Heuristics however do not feature in the literature in relation to either of the other procedures. In addition, there is no recognition of these methods within the discourse of design thinking as an organisational resource. Findings then provide a unique contribution to understanding the combination and interrelationship of the three procedures underpinning design thinking.

Summary

This section has discussed the research findings related to understanding the three procedures of conversation, visualisation and heuristics in design thinking. The design thinking literature is limited in its recognition of these individually, with negligible acknowledgement of the affiliation between them. Research findings present conversation as being used for developing shared meaning and co-creation of solutions. Additionally, it was determined heuristics and visualisation support conversation through providing stimulation and progressing ideas. This highlights their interdependent relationship in progressing a design project.

Further, research findings establish the focus on methods as a differentiating factor between design thinking perspectives. Discussion of procedures was only apparent within the Expert Interview and Second Road studies, both of which are aligned with the perspective of design thinking as a way of life. There was no evidence to support this concept of procedures in design thinking from within the Deloitte study, which

comparatively views design thinking as a way of work. This demonstrates an element of maturity in design thinking where procedures are integrated once a depth of understanding and experience in design thinking is reached. Attention is then shifted from the process and tools toward the knowledge and ability to use procedures flexibly to design and customise activities and the approach according to the context. Findings from this research project however are limited, and as such seek to commence debate on procedures within design thinking. More research into each procedure and their interdependent relationship in practice warrants further investigation. Finally, understanding the procedures and their application in practice provides a foundation to explore the role of tools within design thinking in more depth.

6.1.3 Exploring the role of tools within design thinking

This section presents research findings and discussion exploring the role of tools within design thinking. Participants across all studies were asked to discuss the tools they utilised in practice. In the Expert Interview and Second Road studies findings highlight the need for the design led professional to have a multidisciplinary toolkit that can be adapted and customised to the context. In comparison, within the Deloitte study the tools themselves were the focus. Similarly to the Deloitte study, the literature is limited in its consideration of the broader role of tools within the approach or the capability requirements of the design led professional to know and apply them.

Findings contribute to understanding the role of tools within design thinking and the impact of the design led professional within the process. Further, findings continue to develop the differentiation between the perspectives of design thinking as a way of life and a way of work. This section will explore the implications for a focus on tools, followed by exploring the need for the design led professional to have a flexible toolkit of breadth and depth.

6.1.3.1 Implications for a focus on tools in design thinking

Tools were a core focal point in the Deloitte study. Findings demonstrate that a focus on tools increases the immediate accessibility of design thinking due to their tangibility. However, findings further indicate that without providing sufficient context and knowledge, a focus on tools potentially hinders capability development and eventuates in a limited understanding and application of design thinking.

At Deloitte tools are erroneously thought of as design thinking. In the early stages of introducing design thinking at Deloitte a focus on tools provided freedom of experimentation for people (DA_5, artefact C). While it was evident this was a useful strategy for raising interest and engagement it resulted in many people equating design thinking to a set of tools. This was apparent in language where design thinking was often used as a verb, such as an employee stating 'I'm design thinking' to describe drawing a diagram (DA_28, p.10). It also resulted in people doing 'a little bit of design thinking' (DA_5, p.3). For example, one participant discussed their experience with design thinking through listing several tools they had used:

I've done a bit [of design thinking]. So I've done....two by twos to work out who in fact we're targeting. And I've done some affinity diagram work in terms of the work causes (DA_2, p.5).

It was raised by a number of participants as well as observed by the researcher that this focus on tools, while fuelling engagement, was compromising the organisational understanding and application of design thinking (DA_1, DA_2, DA_5, DA_9, DA_10, DA_21, DA_27, DA_29, DA_FN 28 July 2011, DA_FN 2 August 2011). For example, the researcher observed a financial services project that epitomised this idea of 'a little bit' of design thinking. Though the project was labeled as a design thinking project it commenced with a solution already prototyped, and in doing so missed the Inspiration stage of the process entirely (see 6.1.1). Instead, a small set of tools common to design

thinking, were used to validate and further inform the solution already in development (DA_FN 28 July 2011).

Correspondingly, within the literature design thinking is often equated to a toolkit (Johansson-Skoldberg et al., 2013). Johansson-Skoldberg et al. (2013) claim these toolkits 'focus on the designer's specific methods taken out of context, as tools ready for use' (p.131) without consideration for the knowledge and skills the person using them must have. This is evident with a range of popular toolkits by leading consultants, such as Curedale's (2013) design thinking handbooks, which do little other than describe tools and how to execute them within different process stages. Similarly, IDEO has released several design thinking toolkits aimed at different industries, such as one for educators (Riverdale County School & IDEO, 2011). While this provides more foundational information and context than Curedale's work, it still ultimately presents design thinking as a kit that anyone can pick up and apply, comprised of stages and associated tools to choose from. In this way, tools are separated from the 'culture of design' which Kimbell (2012) states may not have the 'desired results' (p.143). That observation aligns with evidence found in the Deloitte study.

This design thinking as a toolkit outlook is primarily evident within popular business and management viewpoints of design thinking literature and aligns with the perspective of design thinking as a way of work (for example, Curedale, 2013; Fraser, 2012; Liedtka & Ogilvie, 2012). These works ultimately perpetuate the limited understanding of design thinking as evidenced within Deloitte study findings, presenting it primarily as a ready to use toolkit for implementation in any circumstance. Kimbell (2012) argues the reason for these lightweight descriptions of tools is because it is simpler than attempting to understand and explain the deeper thinking processes involved in applying design thinking. While such toolkits are successful in making design thinking more accessible to managers and business, this view ultimately misrepresents the concept as well as the knowledge and skill of the design led professional in its execution. Therefore, while a focus on tools may increase the immediate accessibility of design thinking, it has long term consequences

regarding the understanding and application of design thinking. Rather than a focus on specific tools, understanding the role of tools within the overarching approach requires attention.

6.1.3.2 Design thinking requires a flexible and multidisciplinary toolkit

Design thinking requires a toolkit of multidisciplinary breadth and depth, which can be adapted and customised to the context. This was a focus of discussion within the Expert Interview and Second Road studies yet absent from the Deloitte study. Understanding the composition of the toolkit and its role in practice, as opposed to a focus on specific tools, provides insight into expectations on the capability of the design led professional in practice.

Findings highlight the requirement for the design led professional to have the capability to be flexible and improvise the use of tools according to the situation. Participant EI_4 used a basketball metaphor to illustrate this need for flexibility and improvisation:

You may have some set plays in basketball but you're going to always be improvising on them and shifting them around based on the situation (EI_4, p.8).

This indicates that while a plan may be developed, there is also a need for agility to be able to change 'the play' and respond to situations as they arise. This is inclusive of the ability to appropriately sequence the use of tools as the outcome from one activity will determine the requirements of the next. One participant describes how this occurs in practice:

if you've got a bunch of executives in a room and they've flown in from all over the world or whatever, you can't just go back home and think about it for a

while. You have to basically be ready to adjust...the way that you're organising things to accommodate this shift, this change (EI_4, p.7).

Having the ability to assess the situation and know when to use which tools and in what sequence to progress a project efficiently and effectively is a key consideration in facilitating design thinking projects.

Rather than a ready to use toolkit, as raised in 6.1.3.1, the focus is on the design led professional's ability to customise and improvise between tools. One participant stated:

a design thinker actually makes their own toolkit to suit their purpose...people who are really design thinkers will also find themselves designing the tools that are most appropriate for their situation or their need in that project (SR_2, p.6).

This suggests design thinking in practice considers first what needs to be achieved and then determines what tool will accomplish this best for the context (see also 6.1.1.3). This may include using or adapting existing tools, or creating new ones. This was supported by another participant who reflected:

depending on the nature of the problem, design thinking is actually not the right way of thinking about it...I think the strength comes in acknowledging that there are all of these tools that are available and all these ways of thinking that are available. And the talent is being able to know which one to use in which situation (EI_3, p.1).

In this way the toolkit is not a suite of set tools but adapted and added to continuously. In addition, this indicates the toolkit is not limited to drawing from design but from any knowledge domain as appropriate.

This provides further insight into the perspective of design thinking as a way of life as it demonstrates a macro view of design thinking and its application in practice, rather than focusing on the detail of the specific tools. Further, it highlights significant reliance on the design led professional within the approach to be flexible and adapt to the situation as required.

Improvisation and flexibility are minimally acknowledged within the design thinking discourse. It is recognised that the design led professional improvises solutions and looks for workarounds (Brown & Wyatt, 2010). This implies it would also hold true within the process itself, improvising tools and sequencing of events. Within the broader design research literature, theatre metaphors - including improvisation - have been used to describe design methodologies for decades (Medler & Magerko, 2010). Improvisation involves creating 'group coherence, novelty, speed of execution and lack of planning' as major factors (Chelariu, Johnston, & Young, 2002 in Medler & Magerko, 2010, p.485). Flexibility also forms a significant component where it allows for adaptability in the situation to meet unanticipated ideas and needs (Medler & Magerko, 2010). The literature however focuses primarily on using improvisation and performance techniques within the design process, rather than the design led professional's ability to improvise the process itself.

Yet overall, the sentiment of the purpose and principles of improvisation align with those of applying design thinking in practice. For example Gerber (2007) describes how improvisation can be used to support collaboration, spontaneity, learning through failure and storytelling. Further, in their empirical work observing improvisation performances, Medler and Magerko (2010) found learning to improvise results in an individual being able to anticipate and attend to patterns of behaviour within an environment, and to be able to react almost instantly to progress the situation in their preferred direction. From Expert Interview and Second Road findings, these principles and capabilities appear inherent within the practices of the expert design led professional in design thinking. Participants demonstrate a high level of maturity in

design thinking capability, able to customise and improvise tools and sequencing within a situation as they move through the process to ensure progression toward quality outcomes. This level of maturity is only apparent with participants who align with the perspective of design thinking as a way of life. This has potential implications for the quality of outcomes by those who view design thinking as a way of work, as the focus is more on a systematic process with associated tools (see 6.1.1 and 6.1.3.1).

Further, design thinking utilises a hybrid toolkit comprising an integrated compilation of tools from several disciplines. Most participants recognised that the majority of tools used did not originate from design (SR_4, SR_8, EI_3, EI_8, EI_12). This was captured within several participant interviews where individuals discussed their own practice. For example: 'we really have what we call a hybrid tool box...a lot of what we utilise...comes from outside design' (EI_12, p.7). It was particularly emphasised by one participant where they discussed being present at an academic design thinking conference:

one of the key facts that came out of the conference that was heavily debated...was that no one could identify any activity that was unique to design. Not one (EI_12, p.4).

In addition, it became apparent that some of the appropriated tools have become synonymous with design thinking with little acknowledgement of their true origins. For example one participant discussed the use of workshops:

workshops seem to live within design thinking now even though they've been around forever and used in Six Sigma and all those sorts of things. It's like oh, workshops, must be doing design thinking (EI_3, p.2).

This demonstrates that while design thinking is largely associated with design, its foundation is much broader, with many of the tools appropriated from other

disciplines and knowledge domains. Domain knowledge, however, often did not accompany the adoption of the tools. Instead, it was evident there is an over reliance on design to inform design thinking:

in this... design community people are often neglecting knowledge which is out there...There is so much value and knowledge out there from different disciplines. From management, psychology, organisational behaviour and all that. Things which are really, really important (EI_14).

This participant went on further to discuss the insularity of design and that it often doesn't actively seek out domain knowledge from other disciplines. This presents a potential dichotomy where design thinking espouses its multidisciplinary foundation, yet draws upon knowledge primarily from one discipline only. This supports findings that design thinking does not acknowledge its origins or foundations (as discussed in 5.1.3).

This dichotomy was not evident within the Second Road project review however. Knowledge from several disciplines was heavily drawn upon at a theoretical and practical level to assist in developing tools suitable for the project. Tools originated from disciplines such as anthropology, market research, psychology, and business (SR_3) and were specifically adapted or customised to the context of the project (see also 6.1.1.3). For example, the three horizons model (Baghai, Coley, & White, 1999) formed the basis of an activity developed to assist in explicitly defining the audience the engineering firm wanted to capture. Another example involved the adaptation of Jaques (1989) levels of work where project participants used this framework to map the clients they interacted with throughout the business development process to the varying levels. This demonstrates Second Road's ability to draw from several disciplines to apply and adapt existing tools, and further to use theoretical literature as the foundation for creating usable and meaningful tools customised to the context. Project documentation confirmed that this approach of using academic theory in

practice was compelling to the client, as it demonstrated a grounded knowledge of business and management research and the ability to understand the business environment.

There is limited explicit consideration present in the literature of design thinking integrating tools from multiple disciplines (for example Grefe, 2011; Kimbell, 2011). Rather it appears design thinking has 'claimed' tools by way of association. These are often labeled or implied to be design tools with little acknowledgement of their origins (see Liedtka & Ogilvie, 2011; Riverdale County School & IDEO, 2011; Stanford University, 2010). As an example, mind mapping is a common tool associated with design thinking (Liedtka & Ogilvie, 2011) yet was originally popularised within psychology (Buzan, 1974). This contributes to the seemingly lack of theoretical depth of design thinking as, while it draws upon a broad set of disciplines, it insufficiently seeks to understand or acknowledge them (see 6.1.3.1).

In line with this, there are calls for the design led professional, specifically, to have knowledge and experience from a broad range of disciplines. As Grefe (2011) claims:

Designers must be able to draw on experience and knowledge from a broad range of disciplines, including the social sciences and humanities, in order to solve problems in a global, competitive market of products and ideas...designers need to experience meta-disciplinary study, as well as train deeply in specific disciplines (p.27).

While his opinion is from a graphic design perspective, the sentiment is transferable to design thinking also. This supports findings that design led professionals need to broaden beyond design and/or business as their primary disciplines. Further, findings contribute new insight into understanding how multidisciplinary knowledge and skill can contribute to the depth of design thinking and its acceptance within business. In review, findings and the literature do not provide sufficient evidence of the dichotomy

between acknowledging and practicing multidisciplinary in design thinking, yet it warrants further investigation. However, it is apparent that focus needs to evolve from specific tools toward the multidisciplinary knowledge capability of the design led professional to adopt, adapt and flexibly use tools as appropriate to the situation. This further demonstrates the reliance and expectation on the maturity of the design led professional to lead projects toward successful outcomes (see 6.3).

This section has discussed the findings related to exploring tools within design thinking. The literature is limited in its understanding of the role of tools within design thinking, instead focusing on specific tools and their systematic use within the process. Research findings present that while a focus on tools can assist accessibility and engagement with design thinking in the short term, it potentially hinders a more in depth understanding of the approach. Additionally, the toolkit should draw upon multiple disciplines and be flexible and customisable to the situation at hand.

Further, findings highlight the need for a highly capable design led professional to improvise and adapt the approach as required. This capability was only apparent within participants who align with the perspective of design thinking as a way of life. This implies that the level of maturity within design thinking potentially impacts on the quality of outcomes.

Summary

This section has discussed research findings that relate to the approach in design thinking. The process, procedures and tools associated with design thinking have been considered across the three studies. Findings differed within the Expert Interview and Second Road studies compared with the Deloitte study. These findings illustrate the two perspectives of design thinking, as a way of life and a way of work respectively.

Research findings indicate design thinking as a way of work focuses on the process and tools, considering it a largely linear approach. In comparison, design thinking as a way of life concentrates on the design led professional and their ability to improvise the approach, drawing upon multidisciplinary knowledge and experience, according to the immediate context. The role of the design led professional within design thinking is further explored in 6.2.

6.2 The role of the design led professional

This section presents research findings and discussion exploring the role of the design led professional in leading projects which utilise a design thinking approach.

Participants were not asked directly about the roles they enact, instead these emerged from discussions of their experience in leading projects as well as the personal skills, knowledge and attributes they bring to these roles.

Four core roles were highlighted:

1. Facilitator of the process;
2. Design lead;
3. Educator in design and participation; and
4. Composer of the design experience.

These roles contribute to understanding expectations of the design led professionals capacity and capability in practice. Facilitator and design lead are the only two roles significantly present in the design thinking literature (see 2.2.2.3) (for example Beckman & Barry, 2007; Body, Terrey, & Tergas, 2010; Buchanan, 1992; Golsby-Smith, 2007; Sanders & Stappers, 2008).

This further indicates a path of maturity between the perspectives of design thinking as a way of work and a way of life. The role of facilitator emerges as the key foundational role, as it was the only role discussed across all three studies. As capability and experience increases, as evidenced within the Expert Interview and

Second Road studies, other roles of design lead, educator and composer are integrated into practice.

6.2.1 Facilitator of the design thinking process

Facilitator emerged as the most prominent role across all three studies (EI_2, EI_3, EI_5, EI_7, EI_8, EI_9, EI_11, EI_12, EI_14, EI_15, SR_3, SR_4, SR_8, SR_9, SR_10, SR_11, DA_21, DA_27). Findings indicate the role of facilitator within design thinking drives engagement and progress in a project toward successful outcomes. Expert Interview and Second Road participants reflected a deep knowledge and understanding of the role and how it was enacted within practice. In comparison, some Deloitte participants acknowledged the need for the role yet demonstrated limited understanding of its impact when applying design thinking.

The purpose of the facilitator role is to create an environment of participation and navigate people through the process. This was expressed by one participant as: 'Facilitation is one of the biggest tasks for a designer...They are facilitating the process and they're helping people to express' (EI_14, p.11). The design led professional then is required to be democratic and not own the agenda or solution but instead facilitate a group toward an outcome (EI_2, EI_7). Another participant describes this:

I think you have to be really democratic and hands off in certain situations...in a workshop scenario I think you have to be very careful about how you push your ideas forward and it shouldn't be your ideas, you're more just the facilitator of co-creation ideas (EI_15, p.6).

This suggests the design led professional needs to remain mindfully objective to ensure they do not bias outcomes while still progressing the project in the required direction. While this was a genuine desire from participants, it is tenuous, especially

when other roles such as design lead are considered where the design led professional is ultimately responsible for project outcomes (see 6.2.2).

Navigating people through the process further requires the facilitator to be communicative and provide reassurance (EI_8, EI_9, EI_14). It was highlighted that the facilitator requires active listening skills in order to assess the informational and emotional needs of the group and respond accordingly. One participant states that this means 'really, really listening and being very curious and very open minded' (EI_2, p.8). This was supported by Participant EI_7 who mentioned the purpose for this: 'listening to people and trying to figure out what's going to work in this situation and adapting to the context' (EI_7, p.9).

This is demonstrated within the Second Road study, where facilitated conversation was a primary method for the engineering project. Participant SR_11 described facilitating conversation as:

recognising the purpose for the conversation; understanding its intent, ensuring progress in the right direction; and applying judgement to determine if it's advancing the objective.

Another participant summed this up as understanding the rhythm and energy of the conversation and the participants involved, and having sensitivity to that energy (SR_10). The role of facilitator then goes further than coordinating and navigating people through a process but also requires honed skills of empathy, intuition, listening and mindfulness (SR_11) in order to critically assess a situation and make informed decisions to achieve outcomes in the most appropriate and effective way.

Facilitating participation is recognised as a key element in designing (Brandt in Vaajakallio & Mattelmäki, 2007). Despite this acknowledgement, design research literature explores facilitation in design and the role of the design facilitator nominally

(see 2.2.2.3). Luck (2007), within her observational research of expert and novice architects within participatory design, found that to an observer, expert facilitation appears as a seamless conversation between the design led professional and the project team. Further she concludes that those with accomplished facilitation skills respond to the design problem while simultaneously encouraging individuals to develop their design ideas.

This is echoed by Body, Terrey and Tergas (2010) in their experience working with the Australian Taxation Office to build a design thinking culture. They surmise the key challenge in design facilitation is in being able to read the group and the design challenge concurrently to determining what is needed. This indicates the design led professional requires proficient facilitation skills in order to more than facilitate the design process but be responsive to the situation and lead people through the process of change. Body, Terrey and Tergas (2010) clearly state a design facilitator requires skills: 'not only in facilitation but also in leadership, strategy and change management that will allow the design facilitator to navigate when reality strikes' (p.68). While Body, Terrey and Tergas (2010) place these within areas of domain knowledge, these ideas are congruent with the sentiment expressed by participants regarding intuition, providing guidance and reassurance, listening, and adapting to the situation. These skills, as found within Luck's (2007) research, develop through experience and over time.

This provides an explanation for the limited understanding of the role of facilitation by Deloitte participants. As the majority of participants were novices, they did not have the experience to recognise, nor articulate, the purpose of facilitation or the role of it within design thinking. In contrast, Expert Interview and Second Road participants were cognisant of the need for skillful facilitation in design thinking and how their individual capability impacted on the approach. This has possible implications for the quality of the approach and outcomes from those with limited experience or clear understanding of role requirements. As the findings in this study are largely based on

interviews, they are limited in exposing how design facilitation is enacted in practice. Further research would provide additional insight into the impact of the design led professional's capability within design thinking practice and the knowledge, skills and requirements required.

6.3.2 Design lead

The design lead embodies the role of subject matter expert in designing and design thinking (EI_2, EI_3, EI_5, EI_8, EI_15). This was especially apparent in Expert Interview and Second Road studies where participants were primarily consultants and ultimately accountable for final project outcomes. The role of design lead was particularly illustrated within the Second Road project review. The Second Road team acted as subject matter experts in design to lead a multidisciplinary client team with no design training and little design sensibility. They established a foundation of collaboration with the team and guided them through the project using facilitated conversations and structured activities. Second Road then separately synthesised and made sense of the information generated from these activities and used this as the basis to design from. This was developed into visualisations and prototypes and presented to the client project team to provoke rich discussion and construct further activities to test ideas. The purpose of this was to progress the project in an efficient way and toward the required outcomes that Second Road were accountable for.

This highlights the need for the design led professional to hold the role of design lead while also enabling and engaging a team of people to contribute to a design process. This indicates that while collaboration is a core characteristic of design thinking (see 5.4.1), it is not an equal collaboration between the client and the design led professional. One participant gave an example to illustrate client engagement in a project:

While we were able to involve clients in the thinking process...when it came to the really nitty gritty questions of design and certainly towards the end of the process, our ability to keep them involved and as active participants in some of the key processes ...wasn't...as strong as it could have been and there's [sic] a whole bunch of factors would find that was the case. Including the fact that in some cases they probably didn't have the necessary capabilities to be able to contribute (EI_8, p.7).

This demonstrates the capability level of clients can impact on their level of active participation in the project, which potentially has implications for project outcomes. It is implied that the role of the client is primarily in providing contextual information, creating new knowledge and generating ideas to *inform* the solution rather than *designing* it. While this is critical in the early stages of a project, this role diminishes as the project focus turns toward designing and refining solutions and project deliverables. This underscores the requirement for the role of design lead to use all information gathered and knowledge created to expertly craft and refine design solutions to maximise project outcomes.

The need for leadership and design expertise is acknowledged in the of design research literature (for example, Buchanan, 1992; Sanders & Stappers, 2008) (see 2.2.2.3). This includes technical design skill but also providing clients with sufficient opportunity to contribute to the process and design outcomes (Sanders & Stappers, 2008). The role of design lead, described by Buchanan (1992) as 'master of exploration', moves the design led professional out of the traditional solo role of design expert and into a design subject matter expert, leading a team in a coordinated effort (Howard & Melles, 2011). Buchanan (1992) further acknowledges that all participants in the project require some base understanding and awareness of design to enable fruitful contribution. Sanders and Stappers (2008) agree, arguing it is the responsibility of the design led professional to provide this for participants through

guiding individuals in using appropriate tools and activities which allow them to add value. This alludes to another role as educator, further explored in 6.3.3.

Findings align with this sentiment of requiring design expertise and providing opportunity for clients to participate and collaborate. This turned to reservation however where the limited design capability and capacity of clients can instead form a barrier to maximising design outcomes. This concurs with Brown's (2008) argument that design led professionals can push solutions beyond expectations due to their design expertise. Kimbell (2012) however, disagrees, arguing the design led professional is overprivileged in the design process and should be removed as the main agent of designing. Findings nevertheless illustrate that while the primary activity of the design led professional may not be designing, they remain centre of the design process due to their level of expertise, as well as having responsibility and accountability for outcomes. Further investigation into client collaboration and contribution within a project is justified to understand the varying impacts on the design thinking process and outcomes.

6.3.3 Educator in design and participation

The primary purpose of the role of educator is to equip people to productively participate in a design thinking approach. This juxtaposes the role of facilitator in navigating people through the process and also design lead, acknowledging the need to act as design expert and provide ways for people to contribute. This was strongly acknowledged across both Expert Interview and Second Road studies (EI_2, EI_3, EI_6, EI_7, EI_8, EI_9, EI_12, EI_14, EI_15, SR_3, SR_10). Within the Expert Interview study participants emphasised learning through the design thinking process. Second Road participants extended this, also discussing the need to explicitly integrate training and skill development within projects.

Findings indicate design thinking is inherently a learning experience (EI_2, EI_3, EI_5, EI_6, EI_7, EI_12, EI_14). One participant explicitly discusses this:

a workshop is a learning experience... we're going in there to help them with a specific thing a problem that they have...regardless of whether we're going there for an official learning experience or to help them solve a problem, it's inevitable that we're going to do some skill building (EI_12, p.9)

In this view, teaching is implicit, a naturally occurring component in a design thinking approach. Participant language provides further insight into how design thinking supports these learning experiences. For example one participant discussed prototypes as learning devices:

it's not that they're a prototype, it's the thing to allow a group to learn...and the creation of collaborative boundary objects in group processes to allow groups to learn (EI_5, p.2-3).

Design thinking then is both an individual and group learning experience. Through using design thinking tools and activities, participants not only learn design skills but also about the problem and how they can contribute to solving it.

The sentiment of design thinking as a learning experience is also apparent within the design research and design thinking literature. It is somewhat conclusive that design thinking capability is best acquired through application and experience rather than presentation (Brown, 2009; Liedtka & Ogilvie, 2011; Riel in Martin, 2009). In regard to design more broadly, Dym et al (2006) is in agreement, stating: 'design is both a mechanism for learning and in itself a learning process.' (p.112).

Organisations wanting to develop capability in individuals then need to provide these experiences to staff (Sobel & Groeger, 2012). Riel (in Martin, 2009) agrees using

Proctor and Gamble's evolution to a design led organisation as an example, where it was found 'the importance of design and its transformative effects could not be explained, only experienced' (p.86). The experience of design thinking allowed people to understand it and grasp its potential. Although people will inevitably learn some aspects through experiencing a design approach due to the situated nature of design thinking, it is naive to consider the experience alone is sufficient. In discussing the development of design expertise, Ehn (in Blyth & Kimbell, 2011) highlights that some aspects can be picked up in a workshop or by reading a book, but much cannot. While professional expertise is not the goal in design thinking, this implies the need for more explicit intervention from the design led professional within the process to build the required capability, rather than relying on the implicit learning opportunities through the experience alone.

The role of educator then is to help others think in a designerly way (EI_6). This was most evident when one participant made a distinction between 'designer thinking' and design thinking where the former is the way designers think and the latter 'the way that designers help other people to think' (SR_3). They further stated:

the thing that a lot of designers are not accepting is the responsibility to teach other people to think the way they do so that when other people are designing things like new organisational structures, or the structure of a company they can apply the same methods (SR_3, p.7).

Another participant further emphasises this differentiation between design and design thinking:

I would say I'm not in the business of making hammers, I'm in the business of training carpenters...That's the difference between I think design and design thinking (EI_7, p.8).

This was also described as ‘train the trainer’ (EI_14, p.6). More than just teaching people the minimum skills to be able to contribute to a project, this highlights the goal of instilling practical design capability that can be later implemented in their own work practice or projects. In addition, participants felt teaching the approach throughout the project impacted on project ownership and outcomes (EI_3, p.7). One participant discussed this:

while we are working on their issues, we’re also teaching them this [design thinking] approach... if you don’t teach them that approach, you have two negative effects. One is that they don’t really understand what is going on... and the other is that the solution won’t really land because they haven’t really been part of the process. I think being part of the process is really, really vital in this type of work (EI_2, p.5).

This educational component further provides an empowerment to own the outcomes and in turn, contribute to their longevity beyond project boundaries. Commitment to the role of educator then, is to firstly achieve optimal and sustainable design outcomes; and to second, affect individual change through capability building. This fundamentally shifts the design led professional’s role to one of educating through the experience of participating in a design project (Howard & Melles, 2011).

The Second Road engineering firm project provides an example of the educator role in practice. The purpose for capability building was to enable the client project team to collaborate and contribute effectively to the project. Teaching was explicit through integrating several design training workshops throughout the project. This included interview techniques, how to construct problem statements and generate prototypes. Teaching was also implicit through project design and facilitation where Second Road demonstrated mindfulness and agility in responsively guiding participants through the design approach. In addition, the final report also acted as an educational document, discussing project outcomes and recommendations but also detailing the process and

tools for the organisation to use (Howard & Melles, 2011). This accumulation of learning experiences within one project demonstrates design thinking as a rich educational experience.

The design led professional in the role of educator is not explicitly discussed within the core design thinking literature of relevance to this research project, although it is implicit within study narratives. For example it can be identified where design consultancy IDEO collaborated with health provider Kaiser Permanente to improve the overall quality of both the patient and medical practitioner experiences within a hospital environment. IDEO conducted projects in teams that included both IDEO and Kaiser Permanente staff with the specific purpose of Kaiser staff learning the principles of design thinking and the ability to apply them (Brown, 2008). Kaiser Permanente staff learned through the experience of doing the project as well as being mentored through it. This aided in design thinking being taken to the next level in the organisation, where staff on the project went on to act as an in house innovation consultancy to the rest of the company (Brown, 2009). The role of educator is evident through the explicit skill building and mentoring of staff throughout the project, however the extent of skill development attained is unclear.

Findings then make explicit the role of educator and provide empirical evidence to support the limited literature available. Further, findings demonstrate that people learn through the experience of participating in design thinking. This is extended and amplified when the design led professional makes a considered effort to guide and educate participants through the experience in order to achieve optimal outcomes.

6.3.4 Composer of the design experience

The role of composer involves thoughtful coordination and design of the project and directing how a client experiences it. The role is crucial to ensure participant

engagement and to aid project progress toward outcomes (EI_3, EI_4, EI_14, EI_15, SR_2, SR_10). One participant described:

the kind of work that I do...involves the thoughtful design of meetings really...my work is about...helping organisations that need to make decisions, make changes, develop strategies...intentionally designing a process or a way for them to make this sort of happen in a very collaborative, participatory way (EI_4, p.4).

Another participant described very specifically the structure and design of a workshop to illicit the desired experience:

it's also about the structure of the workshops. It's about having dramatic art in that, it's about having a mix of what we call inhales and exhales. So tasks where people can just sit down and relax and listen to other people or to me as a facilitator talking or just watching a video and then exhaling is about doing things. You need a well mix of that, it should always change. Then it's about starting strong, ending stronger. You should start with a big laugh and a big action but you should end even bigger like with those ahh moments that people have (EI_14, p.4).

This suggests an element of theatre and performance within the design and execution of design thinking to create a story arc that moves through the process with varying dramatic elements and levels of action. This illustrates the need for the thoughtful design of a positive and seamless project experience to encourage participation. Further, it indicates that the role of composer is closely related to the role of facilitator. Where the former is concerned with the design of the experience and the latter is focused on the execution of the experience and navigating people through it.

The role of composer was particularly evident within the prototyping phase of the Second Road engineering firm project. One component involved designing and executing an experiential prototyping activity to test two conversation designs for business development. This was a highly orchestrated experience. The client project team were given roles to enact, developed scripts, and participated in rehearsals, prior to performing a realistic business development scenario with an ex-CEO (who had been briefed separately). As one participant described:

the idea is creating some sort of experience that enables direct participation or engagement as opposed to...sitting on the sidelines...it goes hand in hand with...education (SR_10).

This experience required significant development and on site direction from Second Road in organising and structuring the flow of the event. After cessation of the project, it was evident this experiential prototyping activity provided the richest learning experience for Second Road and the client project team alike toward finalising design outcomes. This example further highlights the interrelationship between the roles of composer and facilitator as well as the role of educator. It acknowledges the performatory nature of creating an orchestrated experience of design thinking where learning occurs to progress toward outcomes.

Beyond descriptions of processes and tools, there is little attention given within the literature to how the design led professional designs and coordinates the experience of a project. Participants raised the metaphor of theatre, to discuss the preparation and planning required in executing design thinking. While this is not uncommon to describe design methods within design research literature (Medler & Magerko, 2010), only a limited set of design thinking literature (for example, Inns, 2013; Sobel & Groeger, 2013) acknowledges the performatory nature of design. Inns (2013) raises the design of workshops within design thinking, stating they are 'theatre' and involve staging a series of acts that moves from 'a fuzzy, ill-defined problem to a solution'

(p.42). In order to achieve this he discusses that all aspects of the workshop need to be designed in advance and that the difference between negative and positive workshop experiences comes down to 'choreography and design'. This implies the need also for rehearsal and staging to ensure the fluidity and flow of the experience through the 'acts'.

The criticality of the designed experience was particularly evident in the empirical research of Sobel and Groger (2013) where they found that a businesses first experience of design thinking needed to be positive for further adoption. She found those who had poor experiences became disenchanted and dropped support for design thinking. From this, Sobel and Groeger (2013) explicitly identified the need for 'well-trained and experienced design thinkers' (p.30). This implies the need for design led professionals with a particular level of capability, as well implying the role of composer to encourage a positive experience.

Findings then make explicit the role of composer and provide empirical evidence to support the limited literature available. The composer is responsible for designing and planning the whole process, as well as each individual activity and sequencing of events. Findings and literature indicate the composed experience works on two levels – in progressing the objectives at hand, as well as providing a rich experience of design. Outlining the value of the role of composer contributes to the literature through highlighting the need for careful design and direction throughout a project.

Summary

This section has discussed research findings for the category, the role of the design led professional. Research findings outline four core roles of the design led professional in projects which utilise a design thinking approach of facilitator, design lead, educator and composer. Aspects of each of these are acknowledged within design research literature, however there is no consideration for the relationship between roles or how

they are enacted in practice. Additionally, the role of facilitator was the only role highlighted across all three studies. Design lead, educator and composer emerged only within the Second Road and Expert Interview studies. This indicates the role of facilitator is foundational, with further roles being enacted as the design led professional matures in capability.

Further, research findings indicate the broadening scope of the design led professional to reach successful design outcomes. There are significant expectations on the knowledge, skills and experience of the design led professional to enact and seamlessly move between roles as required. This further ties back to the need for flexibility and improvisation with the approach (see 6.1.1.3 and 6.1.3.2). This demonstrates the impact of the design led professional on the approach and final outcomes, which are subject to the level of skill and maturity in experience of the design led professional. Consideration then for how to develop the capability of the design led professional who can guide teams to successful and high quality design outcomes warrants further research.

6.3 Creating an environment conducive to design thinking

This section presents research findings and discussion exploring considerations for creating an environment conducive to design thinking. Findings emerged from interview responses and observation regarding how participants enable conditions that assist in creating successful design outcomes. Two aspects were highlighted: the impact of organisational culture on design thinking in practice; and establishing a creative and safe space to enable design thinking at the project level. While these aspects are mentioned in pockets of literature (for example Jenkins, 2008; Martin, 2009) there is limited understanding or discussion on their impact. Findings indicate expectations on the design led professional to adapt and work within the cultural

constraints at the organisational level and encourage creativity and trust at the project level.

This section also provides further insights into the two perspectives of design thinking as a way of work and a way of life. The former acknowledges the organisational culture and focuses on constructing a creative environment. In comparison, the latter seeks strategies to navigate the culture and develop a creative space that emphasises a safe environment.

6.3.1 The impact of organisational culture on design thinking in practice

Organisational culture impacts on how design thinking is applied and also impacts on its outcomes (EI_3, EI_4, EI_8, SR_4, SR_6, DA_3, DA_9, DA_10, DA_18, DA_26). One participant summarises: 'Design thinking, this way of working is linked to the culture very strongly. Some cultures are not capable of working in that' (EI_3, p.12).

Findings suggest organisations need to be culturally ready to accept design thinking as an approach. Further, that design thinking requires a particular cultural environment in order to maximise effectiveness. This is often evident in an organisation's openness or readiness for change. For example, it was apparent from researcher observations that Deloitte was culturally ready to adopt design thinking as they had built a strong innovation culture open to many of design thinking characteristics. Further, two participants from the Second Road study (SR_4, SR_6) had extensive experience working on long term engagements with organisations and reflected at length upon this. One participant discussed how organisations require a strong need or desire to change for design thinking to take hold, and that without this drive people and organisations do not transform (SR_6, p.2). This participant further discussed that Second Road's clients often 'self select' to work with the organisation as they recognise this need for change (SR_6, p3). This was apparent within the Second Road

project review. The engineering firm, despite having excellent products and services, was having increased difficulty in converting these to sales, which was beginning to impact the organisation financially. As a result, there was a recognition of needing to take action and radically change their approach, hence seeking out Second Road. This indicates design thinking requires a cultural readiness as well as a specific impetus for change.

Further, successful integration of design thinking requires cultural change, not just implementation (for example DA_3, DA_9, DA_10, DA_18, DA_26). Within the Deloitte study, one participant discussed the need for integration across the organisation through a cultural shift:

how do we build it through our organisation, how do we get everyone to be thinking in a similar way...Which for us it's about we're trying to bring it into the psyche of the organisation...they're trying to really shift the culture and the mindset of the (DA_10, p.1-2).

A belief emerged that for design thinking to be successfully integrated across Deloitte it needed to be ingrained in the 'DNA' (DA_3, p.6) of the culture.

Further, organisational commitment is required to enable this cultural shift to a new way of thinking and working. One participant emphasised:

that's the element where people might say design thinking fails. Is because it requires the organisational commitment and a lot of resources to turn design thinking into you know fact... Give you design fact. And design fact is what comes out when the whole organisation and its strategies is built around the idea of designing (EI_4, p.14).

An example from the Deloitte study demonstrates an attempt of showing commitment and resources through the development of an office floor with a dedicated design thinking space. As one participant described:

half the floor they're turning into a design thinking space. Having something like that, an asset like that will be marvellous because it's a physical representation of a commitment to it (DA_3, p.5).

For participants this physical representation of commitment would serve as a signifier to the new work practices and behaviours encouraged in the organisation. While there was still considerable confusion evident across the organisation in regard to how design thinking 'fit', Deloitte demonstrated their readiness to adopt design thinking with a culture open to it, an underlying understanding of the need for a cultural change, and demonstrating new work practices and behaviours to employees. This suggests design thinking requires particular conditions to flourish and as a result, is not viable in all circumstances.

Within the literature the impact of organisational culture on design thinking in practice was apparent (see 2.2.3). It arose as one factor that can influence individual project outcomes or integration at an organisational level. This is acknowledged by Martin (2009) and Nussbaum (in Collins, 2013) who both discuss that long standing cultures in many large organisations naturally constrain design and as a result are an impediment to design thinking. Jenkins (2008) extends this in an opinion piece based on his industry experience, which outlines the cultural values he claims are necessary to create a 'design friendly cultural environment' in which design thinking can flourish. These values are related to a number of design thinking characteristics (see 5.4) such as collaboration, shared purpose, learning from failure and experimentation (Jenkins, 2008). Sobel and Groeger (2013) is in agreement, discussing the need for business environments to adapt and change in order to foster the cultural values required for design thinking to work effectively. She presents this as an opportunity within both

design and business ‘to build capabilities and cultures that support a design-thinking mindset and approach’ (Sobel & Groeger, 2013, p.30). This understanding of design values is critical as organisational sponsors are often unaware that integrating design thinking requires an entire cultural transformation and therefore most organisations are not prepared (Jenkins, 2008). As such Boland et al. (2008) advocate the need for leadership to adopt a design attitude, aligning with Jenkins (2008) design values, which encourage transformation in leadership and in turn the organisation. However, while the need for a ‘design friendly cultural environment’ is agreed upon, there is little insight in the literature or findings as to how this might be achieved.

Findings and literature agree that the cultural environment within which design thinking is conducted can have significant impact on its adoption, whether as outcomes from a single project or integration across an organisation. Further, findings provide additional insight into aspects of organisational readiness to accept design thinking and it’s relationship to acknowledging the need for change. Finally, this highlights capability requirements of the design led professional to understand organisational culture and behaviour and be able to navigate these cultural issues.

6.3.2 Establishing a creative and safe space for design thinking

Intentionally providing a creative and ‘safe’ environment provides a foundation for applying design thinking, which encourages conversation, creation and change to occur. All three studies emphasised that the environment at the project level was the responsibility of the design led professional (EI_3, EI_8, EI_9, EI_12, EI_14, SR_4, SR_12, DA_1, DA_3, DA_17, DA_19, DA_26, DA_artefact A, DA_FN 27 June 2011, DA_FN 2 August 2011).

The physical spaces used for a project act as a signifier to the project team of entering a new environment with different expectations outside of their regular work practices. This often involves physically adapting an existing office space or choosing a distinct

geographic location in which to conduct part or all of a project. Examples provided included making craft supplies available to support activities (EI_3) and encouraging people participating to dress more comfortably and casually. This serves to assist in shifting people from a standard work mentality into a creative mindset of possibility (EI_3). For executive and senior leadership at Deloitte this intentional creation of the environment was critical:

What we have realised at the [Stanford] d.school is that if you start looking at design thinking and you really want creativity you actually have to create a different environment physically and mentally (DA_artefact A).

One service line in particular actively engaged in creating project spaces, both within the Deloitte office and within their client's offices as a method for 'getting into the right zone' (DA_17). The researcher observed further attempts at this, where participants organised informal workshops within the office over breakfast or drinks, and at Melbourne Zoo where the function room overlooked wildlife. While leadership discussed creating a different environment physically and mentally, in practice Deloitte focused on creating the physical space believing this would facilitate the needed mental shift.

The need for and role of physical spaces within design thinking is confirmed within the design thinking literature. For example Brown (2009) clearly states: 'Design thinking is embodied thinking - embodied in teams and projects...but embodied in the physical spaces of innovation as well' (p.35). Consideration of space is a critical aspect of applying design thinking, along with the people involved and the project problem. In particular literature highlights the need for designated project spaces. Holloway (2009) describes these as 'project war rooms' with their purpose being to 'create immersive work environments' (p.51) for the project team. The visibility of project materials encourages immersion in the project work and, Brown (2009) claims, allows for the ready identification of patterns and synthesis within data.

While project spaces were mentioned in findings, focus was emphasised toward organising creative physical spaces within project events, such as workshops, to allow project participants to think differently. This aspect is minimally acknowledged within the literature. For example Body (2008) remarked that in integrating design thinking at the Australian Taxation Office physical design spaces were set up to encourage design thinking. Further, Fraser (2012) states the importance of creating spaces conducive to creative collaboration. However in both cases how these spaces are created or their impact on practice is not reflected upon further. So, while literature validates findings regarding the need for consideration of physical space, there is still limited understanding on the effect of the physical environment on project process, progress or outcomes.

While physical space was discussed, emphasis within Expert Interview and Second Road studies was on creating a 'safe space' for project teams to work within. One participant highlighted creating a sense of safety is the first priority within a project: 'the first thing I do...is breaking out those people from their regular life and establish that safe space' (EI_14, p.4). Another participant described this is beyond creating one physical space but a series of tangible and intangible spaces throughout the project:

...one of the big things that we do through conversation is creating a space...with an intent. So the first space that we create is an intent for divergent thinking. So that space feels very safe and playful and different and you're outside of your corporate world. You're actually in a physically different location as well. So all this is done quite deliberately. And we just invite them into that space and when they're in that conversation space they say stuff which they wouldn't normally say if they were in a different space like back at their desk (EI_3, p.8-9).

Although this participant is focusing on the conversational aspect, they indicate varying aspects of the physical and intangible environment, which creates this sense of safe space and progresses the design process. While not explicitly mentioned, the underpinning attribute to this safe space is building trust from which then honest, open dialogue can occur and creativity is enabled. This trust is built between the design led professional and each person in the project team.

Both aspects of physical and safe space were apparent in the Second Road project review. Second Road carefully considered how to use the physical space of a board room and three small meeting rooms they were allocated on site at the engineering firm. There was significant discussion regarding how to transform the space effectively into a 'design studio' and which rooms may be most appropriate for each activity.

In addition to the physical space, Second Road carefully created a safe space for the project team through the planning, design and sequencing of activities. Most activities actively engaged the project team in some form of collaborative making and dialogue, for example through mapping a process or modelling service offerings. With project needs and outcomes in mind, activities were frequently adjusted in the moment to adapt to emergent understanding and ideas. Creating this environment draws in the two roles of composer, in designing the experience of design thinking (see 6.2.4); and facilitator, navigating people through the process to create an environment of trust for the project team to operate within (see 6.2.1). Further, it was apparent that the creation of the project environment provided the foundation to build opportunities and develop relationships to work toward creating a successful solution.

While absent in design thinking discourse, there is recognition in the wider design research literature of the need for trust in order to encourage design participation. This is most prominent within participatory design and co-design literature yet is primarily implied or merely stated in discussions of power and participation without further consideration (for example, Halloran, Hornecker, Stringer, Harris, & Fitzpatrick,

2009; Lucero, Vaajakallio, & Dalsgaard, 2012; Sanders & Stappers, 2008). For example Sanders & Stappers (2008) discusses how co-design threatens power structures as control needs to be relinquished by the design led professional and shared with the entire project team of researchers, designers, clients and others.

This relinquishing of control indicates a need to develop trust in the team to reach the required outcomes. Further Buscher et al. (2002), from a participatory design perspective, discusses the need for commitment and creativity from those who participate in a project stating this also includes a 'sharing of responsibility' which involves 'mutual respect, consideration and trust' (p.1). Halloran et al. (2009), from within co-design, agrees with this clearly stating: 'Co-design relationships have to be built on mutual trust, which is fostered by awareness of, and respect for, each other's values' (p.247). To demonstrate how this can be developed, Halloran et al. (2009) discusses working on a project to redesign the visitor experience of a museum which included a variety of stakeholders from the museum but also local schools.

One strategy included providing opportunities for key project team members to both authentically participate in the process and also contribute to it through demonstrating their expertise and skills. An example of this was allowing the museum curators to give a tour of the museum as part of a design workshop. This gave them the feeling this skill was acknowledged and respected and so engendered trust (Halloran et al., 2009). Overall however the literature provides little empirical insight regarding developing trust other than guiding principles such as respect and an understanding of values. Findings contribute to this gap in the literature through providing insight into how safety and trust are expressed and developed within a project environment. Further research into its contribution to the process and outcomes would be beneficial to understand in more depth the role and impact of trust within design thinking.

These two considerations of designing a creative physical space and safe project environment offer reflections on the two perspectives of design thinking as a way of work and a way of life. Within the Deloitte study, which aligns with the former view, only the creation of physical space is inferred. In comparison, within the Expert Interview and Second Road studies, while the physical space was mentioned, primary attention was on creating a safe space. This indicates maturity, where in Deloitte's infancy in design thinking adoption the focus is on simply getting people to think creatively to support the process. Rather, in the other studies developing trust and new behaviours at a deeper level was the goal, which requires a greater level of knowledge, skill and experience to successfully achieve. This demonstrates a higher expectation on the capability of the design led professional within a project and adds another dimension to understanding design thinking in practice.

Summary

This section has discussed the research findings for the category, creating an environment conducive to design thinking. The impact of organisational culture on design thinking in practice has been described, as well as how to design a creative and safe project environment. Inherent within this is the expectations on the capability of the design led professional to be able to navigate both to maximise design outcomes, yet acknowledging the project level is more in their immediate control. These aspects are limited in their presentation within literature.

Further research findings contribute to understanding the maturity scale between design thinking as a way of work and a way of life. Organisations with an orientation toward the former understood the impact of organisational culture and works toward designing a creative physical space, yet did not recognise the further need for a safe and trusted environment. Design thinking as a way of life in comparison acknowledged all three aspects, demonstrating most concern for creating a safe environment. This suggests that as capability and mindset matures attention shifts from project process

and outcomes toward enabling organisational change. Additional research is needed to fully understand the effect of the organisational and project environment on design thinking project processes and outcomes, including the contribution of the design led professional to the environment.

6.4 Chapter summary

This chapter presents three components of design thinking in practice, of the approach, the design led professional and the environment. Findings highlight the approach, inclusive of process, procedures and tools, associated with design thinking and identifies variances in the approach between the two perspectives of design thinking as a way of work and as a way of life. The former focuses on process and tools, considering it a largely linear approach to problem solving, whereas the latter gives attention instead to the procedures of conversation, visualisation and heuristics, which underpin the approach. Further, concentration is on the design led professional and their ability to improvise and flexibly apply the process and tools according to the immediate context. This recognises the broadening scope of responsibility of the design led professional to reach successful outcomes.

Following this, the four key roles of facilitator, design lead, educator and composer that the design led professional enacts, extended this. Further, it acknowledges the significant expectations on the knowledge, skills and experience of the design led professional to seamlessly move between roles as required. The role of facilitator was the only role highlighted across all three studies, with design lead, educator and composer emerging only within the Second Road and Expert Interview studies. A scale of maturity emerged where the role of facilitator is foundational, with additional roles being enacted as the design led professional matures in capability. This maturity pathway was further validated in exploring considerations of environment in which design thinking is conducted. Orientation toward design thinking as a way of work understood the impact of organisational culture and the need for a creative physical

space. Design thinking, as a way of life, acknowledged and extended this, identifying the need for a safe and trusted environment at the project level. This suggests that as capability and mindset matures attention shifts from project process and outcomes toward enabling individual and organisational change.

These three components of the approach, the design led professional and the environment have a complex interdependent relationship. In particular, a reliance on the design led professional is highlighted to keep all aspects in balance. This is dependent upon the perspective, level of skill and maturity in experience of the design led professional. The design led professional needs to apply process, procedures and tools to the appropriate breadth and depth for the context. Similarly they need to collaborate with and lead a team of people successfully through enacting a number of roles in order for design outcomes to be realised. Finally, this needs to be situated within an organisational environment that is willing to support the resource and time commitment during and after the project to sustain results. Quality design outcomes lie at the centre of these elements working in concert. Therefore, where the literature presents design thinking idealistically, simplistically and generally (see Chapter 3,) findings present that design thinking in practice is a complex phenomena reliant on a tenuous and situated interplay of conditions involving the approach, the environment and most critically, the design led professional. This represents a new contribution to knowledge in understanding design thinking in practice. The next chapter will present models to further explicate findings and discussion regarding the composition of design thinking in practice and perspectives of a way of life and a way of work including a maturity matrix.

7 Mapping perspectives and practice

7.0 Introduction

This chapter proposes two frameworks to contribute further understanding of design thinking conceptually and in practice. The first framework furthers the argument of design thinking as a way of work and as a way of life presented in Chapter 5. It presents a model for understanding these two perspectives and proposes an approach for discerning individual maturity in design thinking. In the second framework the components of design thinking in practice are mapped and their interrelationship discussed. The three elements of approach, the design led professional and the environment are modeled. In particular the level of capability and maturity of the design led professional is emphasised as having significant impact on the conduct and outcomes of design thinking in practice. These frameworks are drawn from and summarise findings and discussion (see Chapters 5 and 6) to contribute to the discourse on design thinking as an organisational resource and provide a way to communicate design thinking in practice within the context of large organisations.

This chapter has two main sections, one for each proposed framework. First a model, which provides a conversation starter for understanding maturity in design thinking for individuals and teams, will be presented along with a discussion on how this can be used in practice. Second, a model depicting the composition of design thinking in practice will be introduced and a new agenda, focusing design thinking research on the design led professional, will be advanced.

7.1 Understanding maturity in design thinking

This section furthers the argument of design thinking as a way of work and as a way of life (see Chapter 5). Design thinking as a way of life is primarily concerned with

procedures and the capability of the design led professional to apply design thinking to encourage quality outcomes. In comparison, design thinking as a way of work is focused on a systematic process with an associated set of tools. These perspectives highlight a scale of maturity in understanding and enacting design thinking. This section presents a framework for these two perspectives and proposes an approach for discerning individual maturity in design thinking and discusses implications for practice.

7.1.1 A design thinking maturity matrix

In exploring the two perspectives of design thinking as a way of work and a way of life (see 5.3) an understanding of capability and how individuals grow to maturity in design thinking emerges. Each perspective has its own definition, key perspective, purpose and key characteristics which were presented in Chapter 5 (see Figure 7.1). The way of work perspective represents a limited view on design thinking where focus is on the process orientation of design thinking for the purpose of innovation. In comparison, the way of life perspective is a deeper, and holistic view of design thinking (see Figure 7.2). This perspective has an altruistic orientation, where process and procedures are underpinned by mindsets with a focus on creating positive change. As such it is inclusive of the way of work perspective and extends upon it through its desire to improve human life. In addition, due to its deep perspective it is able to work on an increased scale of complex and wicked problems. The way of work orientation was highlighted within the Deloitte study and the literature, whereas the Expert Interview and Second Road studies indicated a way of life orientation, understanding and applying design thinking at a deeper level.

Dimensions	Design thinking as a way of life	Design thinking as a way of work
Definition	Design thinking is a way of thinking that uses creativity and collaboration for the purpose of solving complex problems in a human centred way to affect positive change.	Design thinking is a human centred process that uses empathy and creativity for the purpose of problem solving and/ or innovation.
Purpose	Complex problem solving for positive transformation Improving peoples' lives Altruism	Problem solving for innovation Commercial gain Competitive advantage
Key characteristics	Human centredness and empathy Collaboration Creative thinking Visualisation Prototyping Optimism Curiosity Holistic thinking	Human centredness and empathy Collaboration Creative thinking Visualisation Prototyping

Figure 7.1: Two perspectives of design led and business led within design thinking discourse

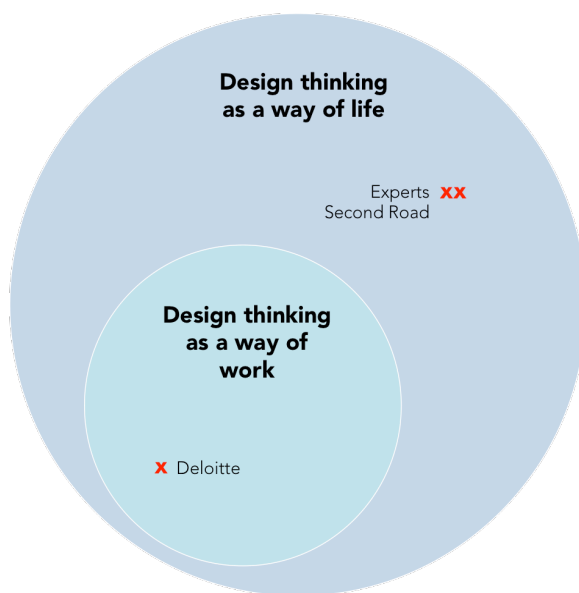


Figure 7.2: Design thinking as a way of work is a subset of design thinking as a way of life

The design thinking matrix (see Figure 7.3) uses two spectrums: the horizontal axis moves from a way of work to a way of life; and the vertical axis from design novice to design expert. The horizontal axis is drawn from research. Rather than depicting opposite extremes, as one moves up the spectrum from a way of work to a way of life

it is inclusive of what comes before it. In this way it is more a scale where moving along the spectrum depicts a growing and deepening understanding of design thinking.

The vertical axis is similarly a scale, in which the level of design expertise is depicted from novice, someone new to design and design thinking conceptually and practically where understanding and skills need to be developed; through to expert, someone who has significant depth of knowledge, skills and experience in design and design thinking. This is informed by Lawson and Dorst's (2011) work on design expertise, where they tested Dreyfus's generic model of expertise, and distinguished seven levels: naive, novice, advanced beginner, competent, expert, master and visionary (Lawson & Dorst, 2009, p.98,100). Dorst's (2010) research particularly identified that these levels impacted on the strategies designers used in complex problem situations. As Lawson (2009) states: 'The nature of the design problem as seen by the designer depends on the level of expertise of the designer in solving the problem' (p.100). Further to this Dorst (2010) observed those with lower levels of expertise worked at a process level while those with higher levels also worked at a practice level where there was consideration for the intellectual and physical environment in which the design was taking place as well. These also inform the perspectives of design thinking as a way of life and way of work.

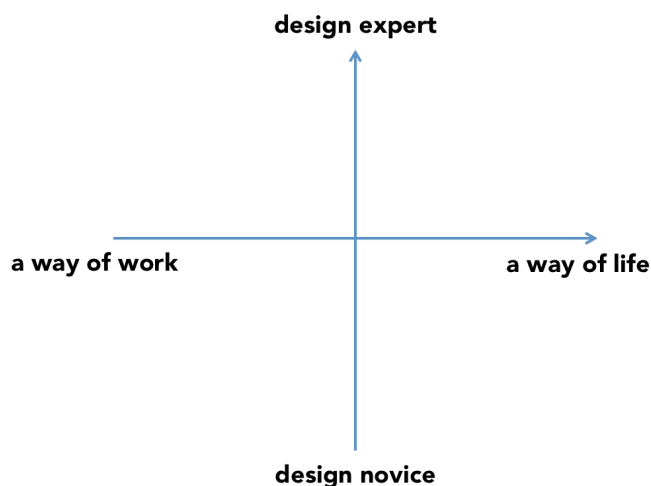


Figure 7.3: Design thinking maturity matrix spectrums

Overall the left side of the matrix depicts a way of work orientation to design thinking and the right side a way of life orientation. Each quadrant then also provides insight into the dimensions of maturity and how this may have implications for practice (see Figure 7.4):

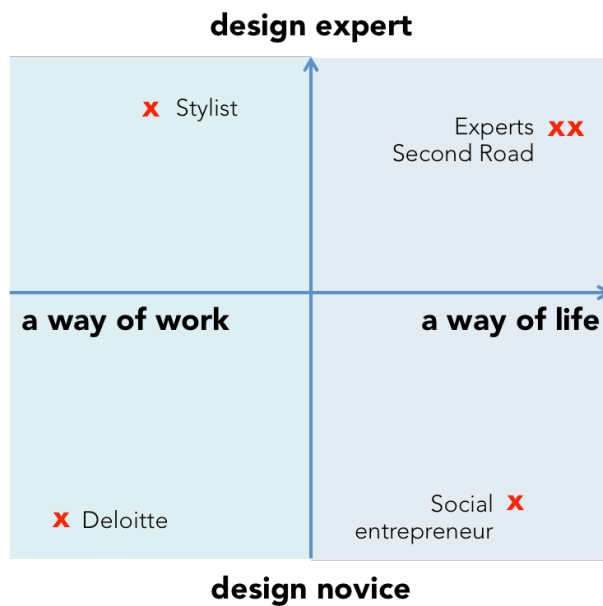


Figure 7.4: Design thinking maturity matrix

The ‘novice - way of work’ quadrant represents those who are new conceptually and practically to design thinking, where they are novices in design knowledge, skills and experience. In this way, they focus on design thinking as a way of doing, anchoring on the process and tools to develop understanding. In this way the ‘novice - way of doing’ individual applies the ‘rules’ of design thinking, perceived as a process and set of tools, to deal with the problem (Lawson & Dorst, 2009). In this quadrant, design is often considered a linear process to move through from problem to solution with limited capability to act outside of designated steps, or be attuned and flexible to the situation, which potentially impacts upon the quality of outcomes. This is where Deloitte were situated in their design thinking journey at the time of data collection. While some individual participants were across other quadrants, the majority of participants were novices to design and viewed design thinking as a way of working.

'Novice - way of life' acknowledges that as design thinking is a way of life and somewhat dispositional, some individuals already view and act in the world in this way, yet potentially via a different naming. While not derived from research data, an example of this is could be social entrepreneurship, where direct action is taken to create new and positive futures (see Martin, 2006; Seelos & Mair, 2005). This aligns with the purpose of design thinking for those with the perspective of design thinking as a way of life. Individuals in this quadrant understand the depth and potential of design thinking, yet are still novices in design knowledge, skills and experience. They may be able to apply the principles of design thinking, owed to their orientation, however the quality of outcomes may be compromised due to being a neophyte in design.

'Expert - way of work' is aligned with aspects of the design thinking as a cognitive process discourse where it is considered the decision making process of a designer. A stylist (see 2.1.1) could be an example of this, however this is derived from the researcher's professional experience rather than research data. They are experts in design knowledge, skills and experience, often with formal design training, yet view design thinking as a way of working. They considering it a discipline where a problem is understood and solution defined by moving through a design process. While outcomes may be functional, polished and professional this process orientation limits the potential to maximise outcomes within more complex situations.

Finally 'expert - way of life' is the quadrant of the design led professional. This is where expertise in design knowledge, skills and experience coincide with a deep understanding of design thinking at a behavioural level, allowing the design led professional to be able to navigate and devise solutions to complex problems. This expertise, coupled with a way of life thinking, is where the design led professional works intuitively and is flexible to adapt to the situation at hand, being able to draw upon their broad domain knowledge and toolkit of breadth and depth to respond appropriately. This marries with Lawson's (2009) notions of design expertise where

navigation through complexity, adaptation to the environment, and moving through problem solving appears seamless.

In this perspective design thinking as a worldview and as a behaviour has been fully integrated into the individual such that it is not something to be applied but rather simply how things are done. It is in this quadrant the design led professional moves beyond design thinking as an approach to masterfully enact all roles of design lead, facilitator, educator, and composer; and consider the environment in which design is conducted (see Chapter 6). Participants from the Expert Interview study and the Second Road study are placed within this quadrant, where individuals have developed expertise in design knowledge and skills and also advanced their thinking and behaviour through their experience over time.

Cross (2011) acknowledged there is still limited understanding of the differences between novice and expert performance in design, including how to help people move from one level to the other. This maturity matrix, drawn from research findings and discussion, commences to provide insight into variations between novice and expert performance in design thinking, as well as a way of work compared to a way of life.

7.1.2 Implications for understanding maturity in practice

Research findings and discussion are primarily concerned with the 'novice - way of work' and 'expert - way of life' quadrants of the design thinking maturity matrix. Comprehending this has several implications for understanding design thinking capability and development as well as for practice. These implications include improving design thinking in practice; developing maturity and moving from 'novice - way of work' to 'expert - way of life'; and the possible impact on quality of outcome.

First, it is proposed that this matrix can be used by an individual to consider their understanding of design thinking and design capability, and where they might place

themselves on the matrix. This might highlight potential strengths and identify areas for development. Further, a project team can attempt to position themselves on the matrix to understand at a high level the perspective and design capability of the team. Findings provide some indication that if the design led professional in particular had more knowledge of the understanding and capability of individuals in the project team, they could then use this to design an approach more customised to the team (see 6.1.3.2, 6.2). It would enable a perception of the level of capability of the team and their ability to participate in various stages of the design process. For example, this could be used to determine the level of explicit design training and education that was required within the project. Further, this model could also be used as a conversation starter for a team to discuss these aspects and develop a shared understanding of team knowledge and capability. The use of the matrix in practice for this purpose requires empirical research. More research into the capability of and creating of teams within design thinking projects overall warrants further investigation. In particular, research into how to be flexible in the approach of projects to meet or grow the capacity of the team to maximise design outcomes.

Second, the maturity matrix highlights the movement between 'novice - way of work' and 'expert - way of life' and potential challenges. Deloitte were placed in the quadrant 'novice - way of work' at the time of data collection. At this time they were still in the commencement phases of introducing and integrating design thinking across the firm. It was apparent that learning design skill from the perspective of design thinking as a way of work provided a foundation from which to build. Design thinking was perceived as a map they could follow in order to reach their desired destination or outcome they were after. It emerged that understanding and developing design thinking capability occurred through skill development of process and tools. In this way design thinking within this quadrant is very teachable.

In comparison, Second Road and participants within the Expert Interview study were located in the 'expert - way of life' quadrant. These participants demonstrated mastery

in design skill and acquiring diverse knowledge sets and mindsets. This resulted in design thinking being viewed as a much more seamless approach, where the design led professional was continuously assessing the situation and adjusting the approach as needed; adapting tools, adjusting sequencing, and moving in and between roles (see 6.1.1.3, 6.1.3.2, 6.2). In this way the design led professional navigates through design thinking, determining the most appropriate course of action depending on the context. This is essentially non teachable, but the result of mastery developed over time and through experience.

While some aspects of moving between quadrants is knowledge and skill based, it is also determined by the degree to which the individual integrates design thinking into their life through their mindset and worldview. This aligns with Martin's (2009) framework for exploring aspects of design thinking capability stating that becoming a design led professional means developing 'the stance, tools and experiences that facilitate design thinking' (p.30). Stance refers to the individual's mindset and view of the world; tools - the models and frameworks individuals use to understand it. In particular Martin (2009) emphasises the development of skills and sensitivities through experiences over time, which is further echoed throughout the literature (see Brown, 2009; Liedtka & Ogilvie, 2011; Riel in Martin, 2009). Ehn (in Blyth & Kimbell, 2011), in discussing the development of design expertise however, makes it clear that as with other professional expertise some aspects can be learned in a workshop or by reading a book, but much cannot. This is one reason for Martin (2009) and Cross (2006) emphasising the need for experiences and time to develop maturity. However, using such concepts to describe capability development are esoteric, with little guidance to practical development. This research is limited in this also. Further research into the differences in the characteristics displayed across the levels and understanding the journey of maturity to move between quadrants is needed. Through this more detailed mapping of the mindsets, knowledge, skills and tools used at different stages of maturity can occur and a pathway to maturity charted.

7.1.3 Implications of maturity on quality of outcomes

As design thinking maturity is developed through experiences and over time, this raises questions in regard to the level of design thinking capability individuals require to ensure quality of outcomes. Within Sobel and Groeger's (2012, 2013) qualitative research on design thinking in Australia, participants identified a lack of skilled people with the broad capabilities, expertise at the required level and experience in this area to work in design thinking roles in organisations.

Findings imply perspective and maturity impacts on quality of outcome. There is an assumption made that the quality of outcome increases based on the primary perspective overarching the project approach (see Figure 7.5). For example, due to the limited understanding of design thinking within the perspective of way of work, the outcome, while it may still be an appropriate and effective solution, has limited potential. In comparison, as design thinking as a way of life embraces a holistic view of design thinking there is a greater possibility of determining the optimal solution and outcomes for the context. This is implied rather than evident within research findings. As a result this warrants further investigation.

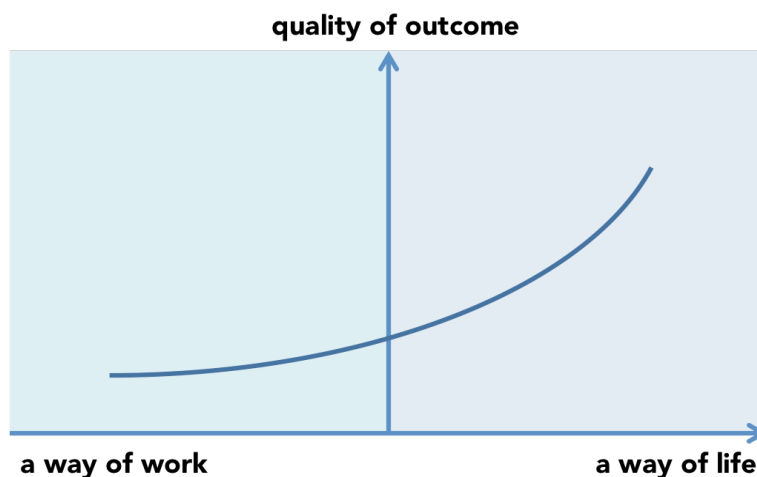


Figure 7.5: Assumption of quality of outcome based on perspective of design thinking

Summary

This section has proposed a maturity matrix of design thinking with dimensions of perspective on design thinking and level of design expertise. The presentation of this maturity matrix commences the conversation in regard to the perspectives of design thinking as a way of work and a way of life and introduces the need for a pathway to maturity and an understanding of the impact of maturity on outcomes. . In addition, this matrix raises the question of what might be the tipping point which moves a design led professional from the perspective of a way of work to a way of life. Further research is needed to understand the levels of maturity and how the placement of the design led professional, individuals and teams within different quadrants affects the quality of outcomes

7.2 Mapping design thinking in practice

This section further articulates findings and discussion regarding the composition of design thinking in practice (see Chapter 6). This section presents a model which maps the composition of design thinking in practice, and highlights the central role of the design led professional. The model draws together the three elements of design thinking that emerged from the data of - the approach, the design led professional and the environment in which design thinking is conducted. It proposes that the interrelationship and interdependencies between the three elements impact on how design thinking is enacted in practice and the outcomes from that enactment.

7.2.1 The interrelationship between elements of design thinking in practice

In understanding the elements of design thinking in practice its complexity needs to be highlighted. Findings and discussion (see Chapter 6) presented three elements of, approach, the design led professional and the environment and how these are

interdependent and interrelated in how design thinking is applied (Figure 7.6). This evidences that design thinking is a situated practice upon which all three aspects influence the outcome. This understanding of mapping design thinking in practice bares some relationship to Kimbell's (2009b) notion of 'design-as-practice'. Kimbell (2009b) suggested this concept as one alternative to the term design thinking. It draws upon practice theory to recognise design as an embodied, 'situated and distributed accomplishment in which a number of things, people, and their doings and sayings, are implicated'. This model can be used, regardless of project scale or complexity, to develop an approach that suitably considers all three aspects and their relationship within the context at an individual, team, department or organisational level. The primary consideration then in applying design thinking is how each of these elements are attended to, or not.

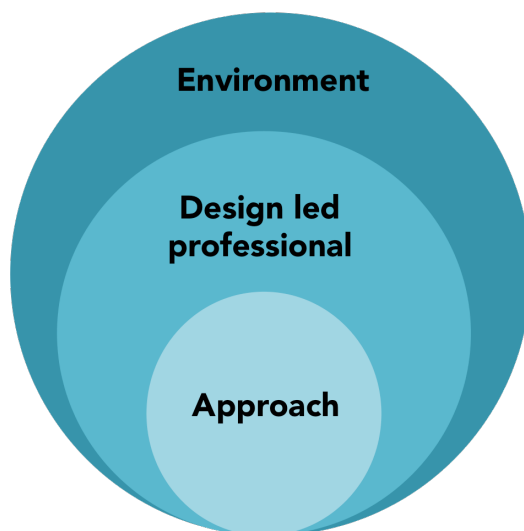


Figure 7.6: Three elements of design thinking in practice

This is dependent upon the design led professional and their capability. For example, participants within the Deloitte study were primarily novices in design thinking. Their focus was on design thinking as a map and they were reliant upon the design process and a set of tools to reach a solution. There was some understanding of the role of the design led professional to the extent of considering the roles of design lead and

facilitator. It was also evident they were aware of and made attempts to organise creative environments in which to conduct projects (see Figure 7.7). Overall however their focus was on the approach with the other two aspects, the design lead and the environment, peripherally acknowledged. It should also be noted that design thinking was being introduced and integrated into an existing culture with well established practices, where design thinking was an additional rather than the primary practice. This also contributed to the focus on the approach over the other elements.

This compares with design thinking in practice as evidenced within the Second Road and Expert Interview studies, where participants are experts in design thinking and design thinking is their primary work practice. Participants in these studies had obtained the level of capability indicated by Deloitte participants but they also extended and built upon each of these elements. In the approach, process and tools were of little interest. Instead a preference for procedures of conversation, visualisation and heuristics were highlighted. Along with this was, the need to be responsive and adaptive to the context and in doing so, utilising whatever procedures and tools was considered most appropriate to progress the project. Stolterman (2008) describes this as designers being 'prepared-for-action' but not 'guided-in-action' by detailed processes and tools. He argues that the design led professional needs to be immersed in the context of a situation and then 'act on that situation with a regard for all of its richness and complexity, and in a way that is appropriate for the specifics of that situation' (p.61).

This was further observed and discussed in relation to participants increased understanding of the design led professional. Along with roles of facilitator and design lead, additional roles of educator and composer were identified as well as the ability to move between the four roles seamlessly, drawing upon a breadth and depth of knowledge sets, skill sets and experiences to adapt to the situation as needed. Finally, there was recognition of the organisational environment being a significant influencer on the project and outcomes, and the need to understand and work within the

organisational culture and the constraints that go with that culture. Expert design led professionals demonstrated an ability to assess the situation from a holistic view to determine a suitable course of action to encourage optimal outcomes.

This serves to demonstrate that the composition of design thinking in practice differs, dependent upon the capability and maturity of the design led professional. While all three elements always exist within a project, the level of attention to each greatly varies based upon the design led professional and the context. How each element is understood and addressed impacts on the final outcome. Focusing on one element, such as the approach as often depicted within the literature and evident within the Deloitte study, misunderstands design thinking and limits its potential.

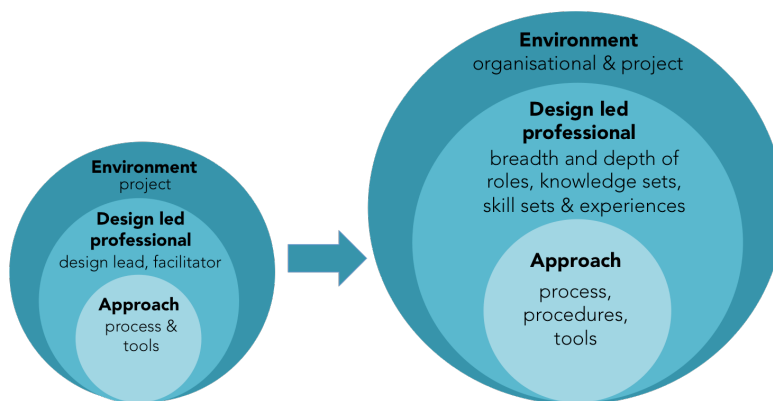


Figure 7.7: Novice compared to expert view of design thinking in practice

7.2.2 A transition in emphasis toward the design led professional

It is evident there is a growing expectation placed on the design led professional to embody a number of roles and have a diverse knowledge and skill set as evidenced within findings (see Chapter 6). Within design thinking in practice, there is a reliance on the design led professional to keep all aspects in appropriate balance for the context. This is dependent upon the perspective, level of skill and maturity in experience of the design led professional. In this way the design led professional is an

enabler. They need to flexibly apply process, methods and tools to the appropriate breadth and depth for the context. Further, they need to collaborate with and lead a team of people through enacting a number of roles, and drawing on a multidisciplinary knowledge set in order for design outcomes to be realised. Finally this needs to be situated within a creative and trusted project environment, and more so within an organisational environment that is willing to support the project resource and time commitment to sustain results. It is implied that quality design outcomes lie at the centre of these elements working in concert. Therefore, findings demonstrate that design thinking in practice is a complex phenomenon reliant on a tenuous and situated interplay of conditions involving the procedures, the environment and most critically, the design led professional (see Figure 7.8). More research into the design led professional, beyond design knowledge and expertise, to also understand more broadly their mindsets, knowledge sets and skill sets would be beneficial to further understand the expert design led professional and their competency set. This would assist in further developing an empirical foundation to understand the critical competencies of the design led professional to support high quality design outcomes. This indicates the need for a transition from a research agenda focused on the design thinking approach toward investigating the design led professional as an enabler.

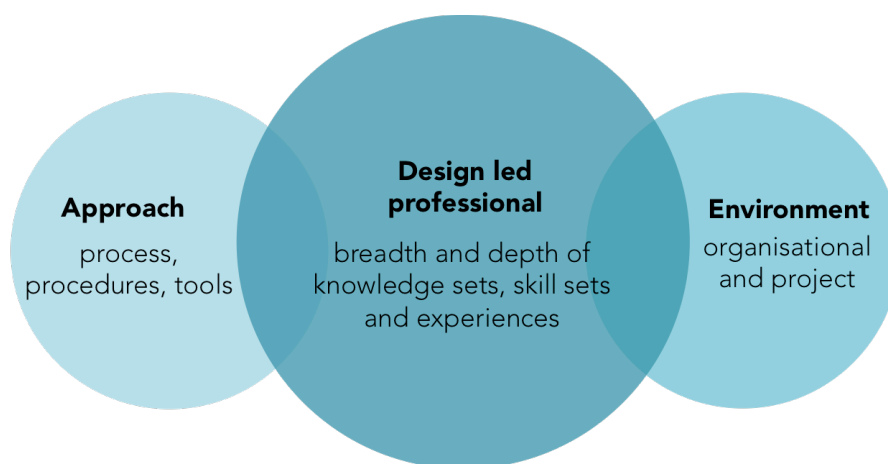


Figure 7.8: The design led professional in focus within design thinking in practice

Summary

This section has further articulated the composition of design thinking in practice and its three components of approach, the design led professional and the environment. In particular the criticality of the design led professional has been highlighted through demonstrating how the comprehension of the three elements of design thinking in practice varies between novice and expert understanding and application, and the potential implications of this. Finally it is proposed that design thinking research advances beyond its emphasis on the approach toward an agenda that investigates the mind sets, knowledge sets and skills sets of the design led professional and how they flexibly apply this in practice. Through this a deeper understanding of design thinking will be achieved and inform the development of practice.

7.3 Chapter summary

This chapter draws together research findings and discussion to propose two models that contribute further understanding of design thinking conceptually and in practice. Firstly, the maturity matrix distinguishes between the two perspectives of design thinking as a way of work and a way of life in relation to level of design thinking expertise. In particular it suggests that the quality of design outcomes is related to the perspective and level of mastery of the design led professional. This is followed by mapping design thinking in practice, which articulates the three elements of approach, the design led professional and the environment. In particular the mindset, knowledge set, and skill set of the design led professional was emphasised as impacting design thinking in practice and the outcomes of that practice.. This resulted in a proposal for a research agenda that focuses on understanding the capability of the design led professional and how it is applied in practice. This would provide insight into how individuals develop design thinking capability. The next chapter will draw together the research within this thesis and make concluding remarks.

8 Conclusions, limitations and further research

8.0 Introduction

This chapter aims to provide conclusions to the research contained within this thesis. It will discuss interpretation of research findings and their contribution to knowledge, the limitations of the research design, and will present an agenda for further research.

This chapter has four main sections. Firstly it will present an overview of the research aims and findings, followed by the claim of contribution to knowledge. It will then discuss limitations resulting from the research approach and outline the transferability of research findings. Following this, an agenda for further research, emergent from this investigation into design thinking in practice, will be presented. The chapter closes with concluding remarks regarding the body of work contained within this thesis.

8.1 Overview of the research aim and findings

The central purpose of this research was to investigate how the design led professional embodies and enacts design thinking in practice within the context of large organisations (see 1.4). This section will provide a summation of research aims, approach and findings.

8.1.1 Research motivation

The motivation for this research derived from three considerations:

- i. the limited academic research examining aspects of design thinking in practice means there is a restricted theoretical base coming out of design and business and management related to the focus of the research; and
- ii. the desire to develop an understanding of how design thinking is enacted in practice and the capability requirements of the design led professional such that this can subsequently inform design thinking practice.
- iii. a personal motivation where the author is new to the design domain and discipline of design thinking, and as such wanted to develop an empirical and practical understanding of the area;

These motivations are set against a backdrop where design thinking has evolved conceptually and widened in scope over the past half century. In particular enthusiasm for design thinking as a creative approach for the purpose of innovation and to solve contemporary business challenges within organisations has risen significantly over the past decade. This research identified that the discourse of design thinking as an organisational resource continues to be ambiguous both conceptually and how it is applied in practice. Within this literature, process and tools are overemphasised; and success stories are more interested in pursuing an agenda than providing insight, evaluation or critique. As interest continues in design thinking the challenge it faces is in demonstrating its value when a lack of clarity in articulating the approach, and how to execute it to ensure optimal design outcomes, exists. In short, as the expectation and aspiration of design thinking continues to rise, as an approach to solve complex problems, it is critical to have clear understanding of the concept and a pragmatic knowledge of how to apply it.

8.1.2 Research approach

The research question formed the initial starting position for this research:

- How does the design led professional understand and enact design thinking in practice?

This question was formalised from the researcher's motivation to develop an empirical and practical understanding of design thinking in practice. This developed from an understanding during data collection of a noticeable gap between the presentation of design thinking in the literature compared to how it is enacted in practice.

A review of the literature (chapter 02) resulted in an understanding that design thinking as an organisational resource is portrayed idealistically, simplistically and generally with little practical insight, consideration for its complexity or empirical foundation. This assisted in informing the development of the research question and the underpinning empirical research approach and design (chapter 03). A case study methodology and ethnographic methods of semi structured interviews, participatory observation and artefact analysis informed data collection across the three studies (chapter 03). These included an expert interview study; a retrospective case study and a participatory case study, which provided a breadth and depth of understanding of the phenomenon in context (chapter 04). Analysis of the research data resulted in research findings that generated a number of categories. These categories were organised across two chapters (chapters 05 and 06), utilising the two overarching themes concerning the meaning and practice of design thinking and contextualised with literature. Drawing from all the data, two models were formulated, relating to understanding maturity in design thinking and mapping design thinking in practice (chapter 07). These models draw together findings and discussion to reveal and communicate a rich picture of design thinking within organisations and provides a framework for making explicit the nature of the design led professional's role.

8.1.3 Research findings

The research question that underpins the research contained within this thesis is:

- How does the design led professional understand and enact design thinking in practice?

This section will discuss to what degree the research question has been answered.

Firstly, research findings demonstrate that design thinking in practice is complex, relying on a set of interdependent factors. Further, the findings highlight that how a design led professional views design thinking impacts on how they enact it in practice.

The development of two models explicitly communicates how design thinking is understood and enacted in practice. The first model reveals the significance of maturity in design thinking on design outcomes. The second model maps the interconnected relationship between the three components of design thinking in practice: approach, the design led professional and the environment in which it is conducted.

In regard to how design thinking is understood findings highlighted:

- Two emergent perspectives of design thinking as a way of life and a way of working. Design thinking as a way of life holistically embraces the full dimensions of design thinking. In comparison, design thinking as a way of working is a subset of this, presenting a narrower and shallower understanding of the concept.
- These two perspectives indicate a scale of maturity in design thinking where individuals commence with tangible anchors of adopting process and tools. Over time and with experience, individuals grow toward adopting design thinking as a way of life, where it becomes not just a way of doing but also a way of being. Further, the primary perspective adopted by individuals impacts on how they apply design thinking in practice.

Findings demonstrate the manner in which design thinking is understood and enacted in practice:

- Design thinking in practice comprises of three interrelated and interdependent components of procedural aspects, the design led professional and the environment in which it is conducted.

- The approach elements of process, procedures and tools highlight variances between the two perspectives of way of working and way of life. The former considers design thinking as a primarily linear approach to problem solving. In comparison, the latter is disinterested in these, giving attention instead to the procedures that underpin the approach of conversation, visualisation and heuristics.
- The design led professional's ability to improvise and flexibly apply the process, methods and tools according to the immediate situation impacts on the approach in practice. This recognises the broadening scope of role and responsibility of the design led professional in leading complex design projects.
- Both the organisational and project environment within which design thinking is applied emerged as influencing how a project is conducted and its outcomes. This includes elements of organisational culture, as well as designing a creative physical space and a safe and trusted environment for the project team to work within.

Where the literature presents design thinking idealistically, simplistically and generally (chapter 02) findings evidence that design thinking in practice is a complex phenomena, reliant on a tenuous and situated interplay of conditions involving the approach, the environment and the design led professional.

Second, research findings present the critical role of the design led professional in leading design thinking projects. In particular they demonstrate a reliance on the design led professional to keep all aspects of design thinking in practice in balance. It emerged that the design led professional works in a role taking capacity where they move in, out and between roles as the situation requires. Findings highlight:

- Four core roles of design lead, facilitator, educator and composer. Design lead embodies the role of being a subject matter expert in designing and design thinking. Facilitator drives engagement and progress in a project toward successful outcomes. Educator equips people to productively participate in a

design thinking project. Finally, composer thoughtfully coordinates and designs the project approach to encourage a positive experience of design itself.

- In applying design thinking in practice the design led professional applies process, methods and tools to the appropriate breadth and depth for the context. In addition, they collaborate with and lead a team of people through the approach in order for design outcomes to be realised. Finally they also design a creative and safe environment for the project to be situated within.

These findings demonstrate significant expectations on the knowledge and skills of the design led professional to enact and seamlessly move between roles as required. Their ability to do this is dependent upon their maturity in design thinking, which comprises their perspective, level of skill and experience. Quality design outcomes lie at the centre of these elements working in concert. Where literature overemphasises process and tools (chapter 02), findings highlight the criticality of the design led professional as the keystone of design thinking in practice.

This section has outlined the ways in which design thinking is understood and enacted in practice. In addition it has outlined the role of the design led professional in applying design thinking to projects and conveys the degree to which this research question has been answered.

Summary

This section has provided an overview of the research aim and findings within this thesis. Research findings have been summarised in order to demonstrate the extent to which the research question has, or has not, been answered by research findings discussed. Three core components of design thinking in practice were highlighted - procedural aspects, the design led professional and the environment in which it is conducted. These are interrelated and interdependent, suggesting a tenuous balance between components is required to achieve optimal outcomes. It is contended the

research contained within this thesis has answered the original research question. Research findings and discussion (in chapters 05 & 06) and further the proposal of models (in chapter 07) demonstrably answer the research question.

8.2 Contribution to knowledge

This section aims to communicate the contribution to knowledge resulting from the research within this thesis. One of the principal motivations for conducting this research was the limited literature available which examined design thinking in practice from a holistic perspective (as outlined in 8.1.1) or examined the value of the role of the design led professional within design thinking. It is in this context that the contribution to knowledge is stated as a framework that communicates a representative picture of the composition of design thinking in practice. This includes outlining the critical position of the design led professional and the core roles they enact for the purpose of achieving optimal outcomes. Finally, a further contribution is a model that indicates design thinking maturity. The claim of contribution to knowledge is made based upon the development of research findings and subsequent validation with literature. These contributions bring together tacit and known elements of design thinking into an explicit and tangible form.

8.2.1 Justification of the claim of contribution to knowledge

The justification of the claim of contribution to knowledge is based primarily upon the assumption of 'creating new understanding of existing issues' and 'identification of new and emerging issues worthy of investigation and explanation' (Trafford & Leshem, 2008, p.141). In this thesis, the existing issue concerned the understanding and enactment of design thinking in practice from a holistic perspective and drawing attention to the interrelationships between factors. This research identified limited academic work in this area, with the majority of literature focusing primarily on the

approach and process and tools. This research has provided an articulation for design thinking in practice

Further, the identification of new and emerging issues included highlighting the criticality of the design led professional within a design thinking approach; and introducing a scale of design thinking maturity based upon two emergent perspectives of design thinking as a way of working and a way of life. The research was conducted through a set of three studies that provided the opportunity to view the phenomena from varying perspectives (see chapters 03 and 04).

This claim of contribution to knowledge is supported by the dissemination of aspects of the conclusions of this research. Since commencing this research the author has published one journal article and three refereed conference papers (see Appendix 2 for full details). These publications aim to demonstrate this research has already contributed to the evidence base in this scholarly area.

8.2.2 Beneficiaries

This section discusses the anticipated beneficiaries of the outcomes of this research.

The beneficiaries are:

- **The Author:** The research and resultant models has benefited the author in that is has provided empirical evidence for how design thinking is enacted in practice and informed the author's practice and professional development
- **The Design Industry:** The research provides design led professionals with an articulation for how design thinking is conducted in practice. In addition it highlights how their level of maturity impacts on the approach and outcomes. This can be used to inform and evaluate professional practice and identify areas of strength and development.

- Students: Design students in particular will be able to understand the complexities of design thinking in practice and use the framework when utilising a design thinking approach. They will also develop an understanding of the mindsets, knowledge and skills they will need to move to mastery as a design led professional.
- Design Educators: Individuals involved in building design capability will be able to use findings and frameworks to support student learning in a variety of design contexts, preparing them for professional roles which use design thinking in industry.
- Academics: Academics interested in design thinking, regardless of discipline, will benefit from the manner in which design thinking in practice is articulated and the presentation of the interrelationships and interdependencies in execution. Further, academics interested in the evolving scope of design and design thinking will benefit from defining the four core roles of the design led professional. In both cases, these have been previously held tacitly by designers and researchers and this further research assists in building an empirical evidence base to further develop design thinking.
- Researchers: Researchers who wish to understand how design thinking is applied in practice can use the models to assess and evaluate the interrelated nature of the components and their impact on outcomes. It may also inform praxis discourse - the interrelation and intersection of theory and practice.

8.3 Limitations of the study

This study has several limitations. This section has two main objectives:

- To draw attention to factors that affect confidence in findings, and
- To consider the extent to which the research findings may be transferrable.

8.3.1 Consideration of limitations

Five limitations are considered relating to the sample composition, research design, data analysis, restricted access to data and data collection methods.

Limitation 01: Composition of sample

The composition of the sample was diverse. In the Expert Interview study this included 12 academics and practitioners who identified with design thinking from around the globe. The Second Road study included 12 practitioners who had significant expertise and experience in design thinking, and were all from the one organisation. Thirdly, the Deloitte Australia study involved 30 participants, where most were novices in understanding and applying design thinking. While this diversity provided a breadth and richness to findings it can also be considered a limitation, as the composition of the sample may not provide a true representation of design thinking in practice.

Further, it may not be sufficiently representative as, in line with a pragmatist approach, convenience sampling was primarily utilised and participants selected based on opportunity, accessibility and timing. In particular in the Expert Interview study, participant recruitment was reliant on the author's network. As a result, some participants had existing connections, which could suggest similar thinking and lead to more homogenous findings. As participants from the Second Road and Deloitte studies are from within the same organisations, this homogeneity within participants in each respective study is to be expected. In addition, while participants were globally distributed in the Expert Interview study, participants in the other two studies were situated in Australia, which may also bias findings toward an Australian viewpoint.

Limitation 02: Research design

The research consisted of three qualitative studies linked by an underlying methodological and analytic commitment to grounded analysis. While it is argued the combination of studies and methods allows for a form of triangulation (Harden & Thomas, 2005) this research design could also be considered a limitation due to the

complexity of cross study comparison. As each study utilised varying research design and employment of methods, this resulted in data sets of differing appearance and size, which made it difficult to infer suitable comparisons between them. It may have been more beneficial to instead standardise research design across studies.

Limitation 03: Data analysis

The diversity in method of data collection and size of data sets may have impacted on overall findings within the analysis phase. There is a potential overemphasis on some forms of data collection within the analysis, such as interviews, as data is more structured and insights more easily extracted than from field notes or artefacts. While some coding decisions are drawn from the literature and participant language, some are also based on the previous experiences and tacit knowledge of the researcher. It is noted that independence of the researcher from the data is problematic and near impossible (Bryman, 2008). This issue was in part addressed through the use of experts and research supervisors in informally testing and validating findings and models. This approach aimed to provide independent views upon the research such that any bias of the author was made apparent and checked.

Limitation 04: Restricted access to research data

As the study primarily engaged with consultants and commercial organisations, access to some data was problematic. At times, participants asked for data that was commercially sensitive to be admonished. This meant that context had to be removed from some data resulting in a lack of depth in some instances. Further, after gaining access to individuals and organisations, at times data was not as forthcoming or as available as expected. For example, in the Deloitte study, study aims had to be readjusted after data collection commenced due to realisation that the organisation was not as progressed in their integration of design thinking, resulting in some data not being available.

Limitation 05: Data collection

The author is new to design and social science research methods. As a result, the author's knowledge and skill may have limited the reliability and richness of data collection. This was in part addressed through receiving training in research methods and developing a firm understanding of methods prior to data collection.

Although five potential limitations with regard to this study have been identified, there is no evidence these limitations have significantly impacted upon research findings. The strength of this study is that the author observed the phenomena over multiple settings and in so doing developed an in depth and broad perspective on design thinking in practice. This research has also enabled the development of a broad understanding of the role of the design led professional in leading the application of design thinking in projects. This research offers a base for other researchers to carry out additional research on design thinking in practice.

8.3.2 Transferability of research findings

In line with a pragmatist approach (see 3.1.1), a tenant of this research is on transferability of findings rather than generalisability: the extent to which the knowledge and learnings from these context-specific studies may reflect and be appropriated and used in another (Morgan, 2007). This involves a moving back and forth between specific results and more general implications to understand principles that may be transferable to other settings. Research findings and models present the composition of design thinking in practice, conceptually and practically representing high level aspects. As a result, the author asserts the resulting models are transferable conclusions from this research.

The reliability and validity of research findings also needs to be considered alongside transferability. Reliability and validity are often challenging issues in qualitative research due to its subjective and interpretative nature (Smith, 2004). Reliability refers to whether research results can be replicated (Smith, 2004). Within this research

reliability is especially a challenge due to the situated nature of data collection. However it is arguably of little importance in qualitative research as a quality measure. While the research design and data collection may be replicated the possibility of reproducing results is questionable due to researchers each bringing their own viewpoint, and in so doing interpretation, of the phenomena (Smith, 2004). For this reason, within this research, reliability has focused on research design rather than replicability of results.

In regard to validity, Hammersley (in Smith, 2004) argues that qualitative research is concerned with 'the extent to which an account is faithful to the particular situation under consideration' (p.959) rather than an attempt at accurately reproducing reality. This moves the discussion of validity in qualitative research to question if a study is plausible and credible (Smith, 2004). The multiple study design allows for study analysis within a study as well as cross study comparison of design thinking in practice across diverse settings (Darke et al., 1998). Multiple cases augment external validity and help guard against observer biases (Leonard-Barton, 1990). This strengthens the validity of case findings as the convergence of information from a variety of sources and sites provides several measures of the same phenomenon (Yin, 1994).

8.4 Agenda for further research

In the process of conducting this investigation the need for further research has been recognised. During the development and conduct of this research the overall aim of this thesis was to develop an understanding of how the design led professional understands and enacts design thinking in practice. This has been achieved. Additional research is desirable to progress findings of this study further:

- Further validation and exploration of the three components of design thinking in practice and testing the resultant model would provide valuable further insight into understanding each component more fully. This would add further depth and detail to findings to understand the complexity of practice more

comprehensively. This approach would ideally be ethnographic, working as a participant observer on a set of projects utilising design thinking from commencement to completion at relevant consultancies. This would enable a deep exploration of the full life cycle of design thinking in practice

- Further research into the two perspectives of design thinking as a way of working and a way of life. Findings suggest optimal outcomes are achieved through the dominance of the perspective of design thinking as a way of life. Additionally, it is suggested that as the perspective of design thinking as a way of working is a limited view of design thinking, outcomes are also limited (see 7.1). This assumption would be of value to explore and test to determine the impact of perspective on project approaches and outcomes.
- The notion of competency levels and reaching maturity in design thinking is touched on throughout this thesis. Further research to explicitly understand the mindsets, knowledge sets, and skills sets required as well as how design led professionals develop from novice to mastery within design thinking would be beneficial. These competencies can then be used to evaluate the capability of the design led professional and indicate development pathways. Extending this, it would be of value to understand how competency level impacts on design thinking in practice and project outcomes. Understanding how design thinking capability is developed would provide a foundation for design educators, design consultancies and organisations to consider how to teach and grow design thinking capability within individuals.
- Finally further investigation into the four roles of facilitator, design lead, educator and composer would benefit from specific investigation and tie into the suggested capability research also. This would serve to validate findings through further investigating each of the roles in detail and when and how they are enacted in practice, and the knowledge and skills required to competently accomplish each role. This would provide an opportunity to map the full scope of how design led professionals work in practice and understand the capability

requirements. The approach would be ethnographic in nature, observing in practice and involve interviewing design led professionals.

This research agenda ultimately aims to extend investigation into major findings from this research to further develop knowledge to influence the improvement of design thinking in practice. Time constraints, the nature of a doctoral study and lack of opportunity prevented the inclusion of these topics in the research contained within this thesis.

This section has discussed an agenda for future research resulting from this thesis. Four potential areas were identified that linked to major research findings: ethnographic research to further explore and test the three components of design thinking in practice and their impact on project outcomes; a study which seeks to understand the impact of perspective on design thinking projects and outcomes; investigation into further developing a maturity model for design thinking capability; and a study to map the roles of the design led professional in practice. The following section will provide concluding remarks to the body of research within this thesis.

8.5 Concluding remarks

This research has presented the components of design thinking in practice and contributes to understanding the complexity of how design thinking is understood and enacted within projects using a design thinking approach. This study identifies the need for clarity in understanding and articulating the various components of design thinking in practice and their interrelationships. The purpose of this is to maximise the possibility for optimum design outcomes.

Understanding design thinking in practice is important to developing design research and practice. Design thinking was commoditised before it was understood, which led to academic and industry debate regarding its definition, value and success yet little in depth investigation occurred. Rylander (in Kimbell, 2011) claimed that while

enthusiasm and the aspiration for design thinking remains high it is apparent it remains not well understood 'either by the public or those who claim to practice it' (p.288). Further Sobel and Groeger (2012) later stated: 'The realistic application and detailed exploration of how design thinking is applied to business is largely absent' (p.7). These claims came almost a decade after the initial rise of design thinking as an organisational resource and remains despite the ongoing increase of interest in design thinking over this time.

The evidence generated through this research provides a framework to assist the public and those who practice design thinking to understand and improve articulation of design thinking. In addition, it provides a foundation for further empirical research that explores the realistic application of design thinking in practice. Design thinking in practice is comprised of the approach, the design led professional, and the environment in which it is conducted. Further there are two emergent perspectives within design thinking discourse of design thinking as a way of working and design thinking as a way of life, which influences the approach to design thinking in practice and provides a scale of maturity.

After conducting the research contained within this thesis, an important reflection is that of the increasing expectations on the design led professional. Research findings demonstrate the design led professional is the linchpin of design thinking in practice, whose mindset, knowledge set, and skill set implements the approach, creates the environment and leads the project. The design led professional is not necessarily formally trained in design or business, however draws on a multidisciplinary knowledge and skill set gained across formal education, professional and life experience. The quality of the outcome rests on the ability of the design led professional to draw upon their knowledge and skill set, and to work in an enabling capacity to bring all aspects of design thinking in practice together in appropriate balance. This realisation involves a need to change the focus in the design thinking

research agenda from the approach of process and tools toward the capability and expertise of the design led professional.

References

- Agar, M. (1996). *The professional stranger* (2nd edition). San Diego: Academic Press.
- Agar, M. (2004). We have met the other and we're all non linear: Ethnography as a nonlinear dynamic system. *Complexity*, 10(2), 16-24. doi:10.1002/cptx.20054
- Atkinson, R., & Flint, J. (2003). Sampling, snowball: Accessing hidden and hard-to-reach populations. In R. L. Miller & J. D. Brewer (Eds.), *The A-Z of Social Research* (pp. 274-280). London: SAGE Publications, Ltd.
- Australian Bureau of Statistics. (2002). 1321.0 – Small business in Australia, 2001. *Australian Bureau of Statistics*. Retrieved from:
<http://www.abs.gov.au/ausstats/abs@.nsf/mf/1321.0>
- Badke-Schaub, P., Roozenburg, N., & Cardoso, C. (2010). Design thinking : A paradigm on its way from dilution to meaninglessness? In: K. Dorst, S. Stewart, I. Staudinger, B. Paton & A. Dong (Eds.). *Proceedings of the 8th Design Thinking Research Symposium (DTRS8)* (pp. 39-49).
- Baghai, M., Coley, S., & White, D. (1999). *The alchemy of growth*. New York: Perseus.
- Banathy, B. H. (1996). *Designing social systems in a changing world*. New York/ London, UK: Plenum.
- Baty, S. (2010). Solving complex problems through design. *Interactions*, 17(5), 70-73. doi:10.1145/1836216.1836235
- Beckman, S., & Barry, M. (2008). Developing design thinking capabilities. *Step Inside Design*, 24(4), 82-87.
- Beckman, S., & Barry, M. (2009). Design and innovation through storytelling. *International Journal of Innovation Science*, 1(4), 151-160. doi: 10.1260/1757-2223.1.4.151
- Beckman, S., & Barry, M. (2007). Innovation as a learning process. *California Management Review*, 5(1), 25-57. Retrieved from: <http://cmr.berkeley.edu/>
- Bell, S. J. (2008). Design thinking. *American Libraries* (January/February), 44-49. Retrieved from: <http://www.americanlibrariesmagazine.org/>
- Benbasat, I., Goldstein, D.K., & Mead, M. (1987). The case research strategy in studies of information systems. *MIS Quarterly*, 11(3), 369-386. Retrieved from:
<http://www.misq.org/>
- Berger, W. (2009). *GLIMMER: How design can transform your life, and even maybe your world*. New York: Penguin Press.
- Bernstein, R. J. (1992). The resurgence of pragmatism. *Social Research*, 59(4), 813-840.

- Retrieved from: <http://www.newschool.edu/cps/social-research/>
- Blyth, S., & Kimbell, L. (2011). *Design thinking and the big society: From solving personal troubles to designing social problems*. London: Actant and Taylor Haig. Retrieved from: http://www.taylorhaig.co.uk/assets/taylorhaig_designthinkingandthebigsociety.pdf
- Body, J. (2008). Design in the Australian Taxation Office. *Design Issues*, 24(1), 55-67. doi: 10.1162/desi.2008.24.1.55
- Body, J., Terrey, N., & Tergas, L. (2010). *Design facilitation as an emerging design skill : A practical approach*. In K. Dorst, S. Stewart, I. Staudinger, B. Paton & A. Dong (Eds.). *Proceedings of the 8th Design Thinking Research Symposium (DTRS8)*.
- Boland, R. J., & Collopy, F. (2004). Design matters for management. In R. J. Boland & F. Collopy (Eds.), *Managing as designing* (pp. 3-18). Stanford, CA: Stanford Business Books.
- Boland, R. J., Collopy, F., Lyytinen, K., & Yoo, Y. (2008). Managing as designing: Lessons for organization leaders from the design practice of Frank O. Gehry. *Design Issues*, 24(1), 10-25. doi: 10.1162/desi.2008.24.1.10
- Boland, R. J., & Collopy, F. (2004). *Managing as designing*. Stanford, CA: Stanford University Press.
- Breslin, M., & Buchanan, R. (2008). On the case study method of research and teaching in design. *Design Issues*, 24(1), 36-40. doi:10.1162/desi.2008.24.1.36
- Brewerton, P. M., & Millward, L. J. (2001). *Organizational research methods*. London: SAGE Publications, Ltd.
- Brown, T. (2008). Design thinking. *Harvard Business Review*, 86(6), 84-92, 141. Retrieved from: <http://hbr.org/>
- Brown, T. (2009). *Change by design: How design thinking transforms organizations and inspires innovation*. New York: Harper Collins.
- Brown, T., & Wyatt, J. (2010). Design thinking for social innovation. *Stanford Social Innovation Review*, Winter, 30-35. Retrieved from http://www.ssireview.org/articles/entry/design_thinking_for_social_innovation
- Bryman, A. (2008). *Social research methods* (3rd edition). Oxford: Oxford University Press.
- Buchanan, R. (1992). Wicked problems in design thinking. *Design Issues*, 8(2), 5-21. Retrieved from: <http://www.mitpressjournals.org/loi/desi>
- Buchanan, R. (2001). Design research and the new learning. *Design Issues*, 17(4), 3-23. <http://www.mitpressjournals.org/loi/desi>
- Buchanan, R. (2008). Introduction: Design and organizational change. *Design Issues*, 24(1), 2-9.

<http://www.mitpressjournals.org/loi/desi>

- Bucolo, S., Wrigley, C., & Matthews, J. (2012). Gaps in organizational leadership: Linking strategic and operational activities through design-led propositions. *Design Management Journal*, 7(1), 18-28. doi: 10.1111/j.1948-7177.2012.00030.x
- Buscher, M., Shapiro, D., Hartswood, M., Procter, R., Slack, R., Vob, A., & Mogensen, P. (2002). *Promises, premises and risks: Sharing responsibilities, working up trust and sustaining commitment in participatory design projects*. Paper presented at the Participatory Design Conference (PDC 2002), Malmo, Sweden.
- Buzan, T. (1974). *Use your head*. London: BBC Books.
- Carlgren, L. (2013). *Design thinking as an enabler: Exploring the concept and its relation to building innovation capabilities* (Doctoral dissertation). Chalmers University of Technology, Gothenberg, Sweden.
- Carr, S.D., Halliday, A., King, A.C., Liedtka, J., & Lockwood, T. (2010). The influence of design thinking in business: Some preliminary observations. *Design Management Review*, 21(3), 58-63. Doi: 10.1111/j.1948-7169.2010.00080.x
- Casakin, H. P. (2007). Factors of metaphors in design problem-solving: Implications for design creativity. *International Journal of Design*, 1(2), 21-33. Retrieved from: <http://www.ijdesign.org/>
- Cavaye, A.L.M. (1996). Case study research: A multi-faceted research approach for IS. *Information Systems Journal*, 6(3), 227-242. Retrieved from: [http://onlinelibrary.wiley.com/journal/10.1111/\(ISSN\)1365-2575](http://onlinelibrary.wiley.com/journal/10.1111/(ISSN)1365-2575)
- Chang, Y., Kim, J., & Joo, J. (2013). An exploratory study on the evolution of design thinking: Comparison of Apple and Samsung. *Design Management Journal*, 8(1), 22-34. Doi: 10.1111/dmj.12001.
- Charmaz, K., & Mitchell, R. (2001). Grounded theory in ethnography. In P. Atkinson, A. Coffey, S. Delamont, J. Lofland & L. Lofland (Eds.), *Handbook of ethnography* (pp. 160-171). London: SAGE Publications Ltd.
- Charmaz, K. (2003). Qualitative interviewing and grounded theory analysis. In J. A. Holstein & J. F. Gubrium (Eds.), *Inside interviewing: New lenses, new concerns* (pp. 311-330). London: SAGE Publications Ltd.
- Charmaz, K. (2006). *Constructing grounded theory: A practical guide through qualitative analysis*. London: SAGE Publications Ltd.
- Charmaz, K., & Henwood, K. (2008). Grounded theory. In C. Willig & W. Stainton-Rogers (Eds.),

- The SAGE Handbook of Qualitative Research in Psychology* (pp. 240-259). London: SAGE Publications Ltd.
- Chelariu, C., Johnston, W., & Young, L. (2002). Learning to improvise, improvising to learn: A process of responding to complex environments. *Journal of Business Research*, 55(2), 141-147. doi:10.1016/S0148-2963(00)00149-1
- Cherryholmes, C. H. (1992). Notes on pragmatism and scientific realism. *Educational Researcher*, 21(6), 13-17. doi: 10.3102/0013189x021006013
- Cherryholmes, C. H. (1994). More notes on pragmatism. *Educational Researcher*, 23(1), 16-18. doi: 10.3102/0013189x023001016
- Clark, K., & Smith, R. (2010). Unleashing the power of design thinking. *Design Management Review*, 19(3), 8-15. doi: 10.1111/j.1948-7169.2008.tb00123.x
- Collins, H. (2013). Can design thinking still add value? *Design Management Review*, 24(2), 35-39. doi: 10.1111/drev.10239
- Conklin, J. (2005). *Dialogue mapping: Building shared understanding of wicked problems*. New York: Wiley.
- Conley, C. (2007). Educating designers for broad roles in organizations. *Design Management Review*, 18(3), 10-17. doi: 10.1111/j.1948-7169.2007.tb00208.x
- Cooper, R., Junginger, S., & Lockwood, T. (2009). Design thinking and design management : A research and practice perspective. *Design Management Review*, 20(2), 46-55. doi:10.1111/j.1948-7169.2009.00007.x
- Cross, N. (2001). Designerly ways of knowing: Design discipline versus design science. *Design Issues*, 17(3), 49-55. doi: 10.1162/074793601750357196
- Cross, N. (2011). *Design thinking: Understanding how designers think and work*. Oxford: Berg Publishers.
- Cross, N. (2006). *Designerly Ways of Knowing*. London: Springer.
- Cruickshank, L., & Evans, M. (2012). Designing creative frameworks: Design thinking as an engine for new facilitation approaches. *International Journal of Arts and Technology*, 5(1), 73-85. doi: 10.1504/IJART.2012.044337
- Curedale, R. (2013). *Design thinking: Processes and methods manual*. Topanga, CA: Design Community College Inc.
- Dalsgard, P. (2014). Pragmatism and design thinking. *International Journal of Design*, 8(1), 143-155. Retrieved from: <http://www.ijdesign.org/ojs/index.php/IJDesign/index>
- Darke, P., Shanks, G., & Broadbent, M. (1998). Successfully completing case study research: combining rigour, relevance and pragmatism. *Information Systems Journal*, 8(4), 273-

289. Retrieved from: [http://onlinelibrary.wiley.com/journal/10.1111/\(ISSN\)1365-2575](http://onlinelibrary.wiley.com/journal/10.1111/(ISSN)1365-2575)

- de Vaus, D. (2006). Retrospective study. In V. Jupp (Ed.), *The SAGE dictionary of social research methods* (pp. 268-270). London: SAGE Publications, Ltd.
- Domschke, M., Bog, A., & Zeier, A. (2009). *Teaching design thinking to software engineers: Two future-oriented curriculum case studies*. Paper presented at the 26th ICSID World Design Congress, Design Education Conference, Singapore.
- Dorst, K. (2011). The core of 'design thinking' and its application. *Design Studies*, 32(6), 521-532. doi: 10.1016/j.destud.2011.07.006
- Dorst, K., & Cross, N. (2001). Creativity in the design process: co-evolution of problem-solution. *Design Studies*, 22(5), 425-437. doi: 10.1016/S0142-694X(01)00009-6
- Dorst, K. (2010). *The nature of design thinking*. In K. Dorst, S. Stewart, I. Staudinger, B. Paton & A. Dong (Eds.). *Proceedings of the 8th Design Thinking Research Symposium (DTRS8)*.
- Douglas, J. (1976). *Investigative social research*. London: SAGE Publications.
- Dubberly, H., & Pangaro, P. (2009). What is conversation? How can we design for effective conversation? *Interactions*, 16(4), 22-28. doi: [10.1145/1551986.1551991](https://doi.org/10.1145/1551986.1551991)
- Duncan, A. K., & Breslin, M. A. (2009). Innovating health care delivery: the design of health services. *Journal of Business Strategy*, 30(2/3), 13-20. Retrieved from: <http://www.emeraldgroupublishing.com/products/journals/journals.htm?id=jbs>
- Dunne, D., & Martin, R. (2006). Design thinking and how it will change management education: An interview and discussion. *Management Learning*, 5(4), 512-523. Retrieved from: <http://aom.org/amle/>
- Dym, C. L., Agogino, A. M., Eris, O., Frey, D. D., & Leifer, L. J. (2006). Engineering design thinking, teaching, and learning. *IEEE Engineering Management Review*, 34(1), 65-92. doi: 10.1002/j.2168-9830.2005.tb00832.x
- Eisenhardt, K. M. (1989). Building theories from case study research. *The Academy of Management Review*, 14(4), 532-550. Retrieved from: <http://aom.org/amr/>
- Emerson, R. M., Fretz, R. I., & Shaw, L. L. (2001). Participant observation and field notes. In P. Atkinson, A. Coffey, S. Delamont, J. Lofland & L. Lofland (Eds.), *Handbook of Ethnography* (pp. 352-368). London: SAGE Publications.
- Esslinger, H. (2009). *A fine line: How design strategies are shaping the future of business*. San Francisco, CA: Jossey-Bass.

- Feilzer, M. Y. (2010). Doing mixed methods research pragmatically: Implications for the rediscovery of pragmatism as a research paradigm. *Journal of Mixed Methods Research*, 4(1), 6-16. doi: 10.1177/1558689809349691
- Flyvbjerg, B. (2006). Five misunderstandings about case-study research. *Qualitative Inquiry*, 12(2), 219-245. doi: 10.1177/1077800405284363
- Fraser, H. M. A. (2009). Designing business: New models for success. *Design Management Review*, 20(2), 57-65. doi: 10.1111/j.1948-7169.2009.00008.x
- Fraser, H. M. A. (2007). The practice of breakthrough strategies by design. *Journal of Business Strategy*, 28(4), 66-74. doi: 10.1108/02756660710760962
- Fraser, H. M. A. (2012). *Design works: How to tackle your toughest innovation challenges through business design*. Toronto: University of Toronto Press.
- Fulton Suri, J., & Hendrix, R. M. (2010). Developing design sensibilities. *Rotman Magazine*(Spring), 58-63. Retrieved from: <http://www.rotman.utoronto.ca/Connect/Rotman%20MAG.aspx>
- Galliers, R. (1992). Choosing information systems research approaches. In R. Galliers (Ed.), *Information systems research: Issues, methods and practical guidelines* (pp. 144-162). Oxford: Blackwell Scientific.
- Garcia, L. M. (2012). Understanding design thinking, exploration and exploitation: Implications for design strategy. In T. M. Karjalainen (Ed.), *IDBM Papers volume 2* (pp. 150-161). Helsinki: Aldus.
- Georges, A., & Romme, L. (2003). Making a difference: Organization as design. *Organization Science*, 14(5), 558-573. doi: 10.1287/orsc.14.5.558.16769
- Gerber, E. (2007). *Improvisation principles and techniques for design*. Paper presented at the CHI 2007: Learning and Education, San Jose, CA, USA.
- Gigerenzer, G., & Gaissmaier, W. (2011). Heuristic decision making. *Annual review of psychology*, 62, 451-482. doi: 10.1146/annurev-psych-120709-145346
- Gilbert, D. H., Smith, A. C. T., Sutherland, F., & Williams, P. (2012). *Business model innovation and design thinking: A case study of Deloitte Digital*. Paper presented at the Leading Innovation through Design, DMI 2012 International Research Conference, Boston, MA., USA.
- Golsby-Smith, T. (2007). The second road of thought: how design offers strategy a new toolkit. *Journal of Business Strategy*, 28(4), 22-29. doi: 10.1108/02756660710760917

- Greene, J., Benjamin, L., & Goodyear, L. (2001). The merits of mixing methods in evaluation. *Evaluation*, 7(1), 25-44. doi: <http://dx.doi.org/10.1177/13563890122209504>
- Grefe, R. (2011). Experience design is the only design. *Design Management Review*, 22(4), 26-30. doi: 10.1111/j.1948-7169.2011.00153.x
- Halloran, J., Hornecker, E., Stringer, M., Harris, E., & Fitzpatrick, G. (2009). The value of values: Resourcing co-design of ubiquitous computing. *CoDesign: International Journal of CoCreation in Design and the Arts*, 5(4), 245-273. doi: 10.1080/15710880902920960
- Hammersley, M. & Atkinson, P. (2007). *Ethnography: principles in practice* (3rd ed.). London: Taylor & Francis.
- Hannes, K., & Lockwood, C. (2011). Pragmatism as the philosophical foundation for the Joanna Briggs meta-aggregative approach to qualitative evidence synthesis. *Journal of Advanced Nursing*, 67(7), 1632-1642. doi: 10.1111/j.1365-2648.2011.05636.x
- Hansen, J. T. (2006). Counseling theories within a postmodernist epistemology: New roles for theories in counseling practice. *Journal of Counseling & Development*, 84(Summer), 291-297. Retrieved from: [http://onlinelibrary.wiley.com/journal/10.1002/\(ISSN\)1556-6676](http://onlinelibrary.wiley.com/journal/10.1002/(ISSN)1556-6676)
- Harden, A., & Thomas, J. (2005). Methodological issues in combining diverse study types in systematic reviews. *International Journal of Social Research Methodology*, 8(3), 257-271. doi: 10.1080/13645570500155078
- Henry, G. T. (1990). *Practical Sampling*. Thousand Oaks, California: SAGE Publications.
- Holloway, M. (2009). How tangible is your strategy? How design thinking can turn your strategy into reality. *Journal of Business Strategy*, 30(2/3), 50-56. doi: 10.1108/02756660910942463
- Hood, J. C. (2007). Orthodoxy vs. power: The defining traits of grounded theory. In A. Bryant & K. Charmaz (Eds.), *The SAGE Handbook of Grounded Theory* (pp. 151-164). London, UK: SAGE Publications Ltd.
- Horvath, I. (2006). *Design competence development in an academic virtual enterprise*. Paper presented at the IDETC/CIE (International Design Engineering Technical Conferences and Computers and Information in Engineering) Conference, Philadelphia, Pennsylvania, USA.
- Howard, Z. & Melles, G. (2011). *Beyond designing: roles of the designer in complex design projects*. In D. Stevenson (Ed.), *Proceedings of 23rd Australian Computer-Human*

- Interaction (OzCHI) Conference, Canberra, Australia (pp. 152-155). doi: 10.1145/2071536.2071560.
- IDEO. (2010). Human centered design toolkit. Retrieved from <http://www.ideo.com/work/human-centered-design-toolkit/>
- Inns, T. (2013). Theaters for design thinking. *Design Management Review*, 24(2), 40-47. doi: 10.1111/drev.10240
- Jackson, J. E. (1990). "I am a fieldnote": Fieldnotes as a symbol of professional identity. In R. Sanjek (Ed.), *Fieldnotes: The makings of anthropology* (pp. 3-33). Ithaca, NY: Cornell University Press.
- Jaques, E. (1989). *Requisite organization*. Virginia: Cason-Hall.
- Jenkins, J. (2008). Creating the right environment for design. *Design Management Review*, 19(3), 16-22. doi: 10.1111/j.1948-7169.2008.tb00124.x
- Jenkins, J. (2010). 'Things can be other than they are'. Understanding the limitations of current management thinking and knowledge practice for work in the development sector. In S. Cummings & T. Stanton (Eds.), *IKM Working Paper: IKM Emergement*. Retrieved from http://wiki.ikmemergent.net/files/1102_IKM_Summary_Working_Paper10_English.pdf
- Johansson-Skoldberg, U., Woodilla, J., & Cetinkaya, M. (2013). Design thinking: Past, present and possible futures. *Creativity and Innovation Management*, 22(2), 121-146. Retrieved from: [http://onlinelibrary.wiley.com/journal/10.1111/\(ISSN\)1467-8691](http://onlinelibrary.wiley.com/journal/10.1111/(ISSN)1467-8691)
- Johnson, R. B., Onwuegbuzie, A. J., & Turner, L. A. (2007). Toward a definition of mixed methods research. *Journal of Mixed Methods Research*, 1(2), 112-133. doi: 10.1177/1558689806298224
- Jones, J. C. (1970). *Design methods*. Chichester: Wiley.
- Jones, P. & Van Patter, G.K. (2013). NextDesign geographies: Understanding design 1,2,3,4: The rise of visual sensemaking. In T. Poldma (Ed.), *Meanings of designed spaces* (pp.331-342). New York: Fairchild Books.
- Julier, G. (2008). *The culture of design* (2nd ed.). London: SAGE Publications Ltd.
- Kangas, K., Seitamaa-Hakkarainen, P., & Hakkarainen, K. (2012). Design thinking in elementary students' collaborative lamp designing process. *Design and Technology Education: An International Journal*, 18(1), 30-43. Retrieved from: <http://ojs.lboro.ac.uk/ojs/index.php/DATE/index>

- Kimbell, L. (2009a). *Beyond design thinking : Design-as-practice and designs-in-practice*. Paper presented at the Centre for Research on Socio-Cultural Change (CRESC) Annual Conference, Manchester.
- Kimbell, L. (2009b). *Design as practice in design thinking*. Paper presented at the Paper presented at the European Academy of Management, London.
- Kimbell, L. (2011). Rethinking design thinking: Part I. *Design and Culture*, 3(3), 285-306. doi: 10.2752/175470811x13071166525216
- Kimbell, L. (2012). Rethinking design thinking: Part II. *Design and Culture*, 4(2), 129-148. doi: 10.2752/175470812x13281948975413
- Kolko, J. (2012). Wicked problems: Problems worth solving. *Stanford Social Innovation Review*. Retrieved from http://www.ssireview.org/articles/entry/wicked_problems_problems_worth_solving
- Kvale, S. (2007). *Doing interviews*. London, UK: SAGE Publications, Ltd.
- Lambert, S. D., & Loisel, C. G. (2008). Combining individual interviews and focus groups to enhance data richness. *Journal of Advanced Nursing*, 62(2), 228-237. doi: 10.1111/j.1365-2648.2007.04559.x
- Lawson, B. (2006). *How designers think: The design process demystified* (4th ed.). Oxford: Architectural Press.
- Lawson, B., & Dorst, K. (2009). *Design expertise*. Oxford, UK: Elsevier.
- Leonard-Barton, D. (1990). A dual methodology for case studies: Synergistic use of a longitudinal single site with replicated multiple sites. *Organization Science*, 1(3), 248-266. doi: 10.1287/orsc.1.3.248
- Liedtka, J. (2013). Design thinking: What it is and why it works. *Design at Darden Working Paper Series*. Retrieved from <http://batten.squarespace.com/academic-papers/>
- Liedtka, J., & Ogilvie, T. (2012). Helping business managers discover their appetite for design thinking. *Design Management Review*, 23(1), 6-13. doi: 10.1111/j.1948-7169.2012.00165.x
- Liedtka, J., & Ogilvie, T. (2011). *Designing for growth: A design thinking tool kit for managers*. New York: Columbia University Press.
- Liedtka, J. (2001). Strategy formulation: The roles of strategy and design. In M. A. Hitt, R. E. Freeman & J. S. Harrison (Eds.), *The Blackwell handbook of strategic management* (pp. 70-94). Oxford: Blackwell Publishers.
- Lindberg, T., Noweski, C., & Meinel, C. (2010). Evolving discourses on design thinking: How

- design cognition inspires meta-disciplinary creative collaboration. *Technoetic Arts: A Journal of Speculative Research*, 8(1), 31-37. doi: 10.1386/tear.8.1.31/1
- Lockwood, T. (2009). *Design thinking: Integrating innovation, customer experience, and brand value*. New York: Allworth Press.
- Lofland, J. (1971). *Analyzing social settings: A guide to qualitative observation and analysis*. Belmont, CA: Wadsworth.
- Lucero, A., Vaajakallio, K., & Dalsgaard, P. (2012). The dialogue-labs method: Process, space and materials as structuring elements to spark dialogue in co-design events. *CoDesign: International Journal of CoCreation in Design and the Arts*, 8(1), 1-23. doi: 10.1080/15710882.2011.609888
- Luck, R. (2007). Learning to talk to users in participatory design situations. *Design Studies*, 28(3), 217-242. doi: 10.1016/j.destud.2007.02.002
- Martin, R. (2009). *The design of business: Why design thinking is the next competitive advantage*. Boston, MA: Harvard University Press.
- Martin, R. (2010). Design thinking: achieving insights via the “knowledge funnel”. *Strategy & Leadership*, 38(2), 37-41. doi: 10.1108/10878571011029046
- Mattelmäki, T., & Sleeswijk Visser, F. (2011). *Lost in Co-X: Interpretations of co-design and co-creation*. Paper presented at the Diversity and Unity, IASDR2011, the 4th World Congress on Design Research, Delft, the Netherlands.
- Medler, B., & Magerko, B. (2010). *The implications of improvisational acting and role playing on design methodologies*. Paper presented at the CHI2010: Dance, Dust , and Drama: Designing Design, Atlanta, GA, USA.
- Melles, G. (2008). New pragmatism and the vocabulary and metaphors of scholarly design research. *Design Issues*, 24(4), 88-101. Retrieved from: <http://www.mitpressjournals.org/loi/desi>
- Meroni, A., & Sangiorgi, D. (2011). *Design for services*. London: Gower Publishing Company.
- Miles, M. B., & Huberman, A. M. (1984). *Qualitative data analysis: a sourcebook of new methods*. Newbury Park: Sage Publications.
- Montgomery, P., & Bailey, P. H. (2007). Field notes and theoretical memos in grounded theory. *Western Journal of Nursing Research*, 29(1), 65-79. doi: 10.1177/0193945906292557
- Morgan, D. L. (2007). Paradigms lost and pragmatism regained: methodological implications of combining qualitative and quantitative methods. *Journal of Mixed Methods Research*, 1(1), 48-76. doi: <http://dx.doi.org/10.1177/2345678906292462>

- Nelson, H. G. & Stolterman, E. (2013). *The design way: Intentional change in an unpredictable world* (2nd ed.). Cambridge, Mass.: MIT Press.
- Nielsen, J. (1994). Heuristic evaluation. In J. Nielsen & R. L. Mack (Eds.), *Usability Inspection Methods* (pp.25-62). New York, NY: John Wiley & Sons.
- Nussbaum, B. (2011). Design thinking is a failed experiment. So what's next? Retrieved from <http://www.fastcodesign.com/1663558/design-thinking-is-a-failed-experiment-so-whats-next>
- Okumus, F., Altinay, L., & Roper, A. (2007). Gaining access for research: Reflections from experience. *Annals of Tourism Research*, 34(1), 7-26. doi: 10.1016/j.annals.2006.07.006
- Owen, C. (2007). Design thinking: Notes on its nature and use. *Design Research Quarterly*, 2(1), 16-27. Retrieved from: <http://www.drsg.org/>
- Parsey, T., & Topp, E. (2010). Meaningful value and design thinking. *Innovation*(Winter), 41-44. Retrieved from: <http://www.idsa.org/innovation>
- Porcini, M. (2009). Your new design process is not enough - hire design thinkers! *Design Management Review*, 20(3), 6-18. doi: 10.1111/j.1948-7169.2009.00017.x
- Prior, L. (2004). Documents. In C. Seale, G. Gobo, J. F. Gubrium & D. Silverman (Eds.), *Qualitative research practice* (pp. 345-360). London: SAGE.
- Razzouk, R., & Shute, V. (2012). What is design thinking and why is it important? *Review of Educational Research*, 82(3), 330-348. doi: 10.3102/0034654312457429
- Rittel, H. W. J., & Webber, M. M. (1973). Dilemmas in a general theory of planning. *Policy Sciences*, 4, 155-169. doi: 10.1007/BF01405730
- Riverdale County School, & IDEO. (2011). Design thinking for educators. Retrieved from <http://www.designthinkingforeducators.com>
- Rogers, Y., & Bellotti, V. (1997). Grounding blue-sky research: How can ethnography help. *Interactions*(May + June), 59-63. doi: [10.1145/255392.255404](https://doi.org/10.1145/255392.255404)
- Romme, A., & Georges L. (2003). Making a difference: Organization as design. *Organization Science*, 14(5), 558 - 573. doi: 10.1287/orsc.14.5.558.16769
- Rorty, R. (1991). *Objectivity, relativism and truth: philosophical papers*. Cambridge, UK: Cambridge University Press.
- Rorty, R. (1999). *Philosophy and social hope*. London: Penguin Books.
- Rowe, P. G. (1987). *Design thinking*. Boston, MA: MIT Press.

- Runyan, W.M.K. (1982). In defense of the case study method. *American Journal of Orthopsychiatry*, 52(3), 440-446. doi: 10.1111/j.1939-0025.1982.tb01430.x
- Rylander, A. (2009). Design thinking as knowledge work: Epistemological foundations and practical implications. *Design Management Journal*, 4(1), 7-19. Doi: 10.1111/j.1942-5074.2009.00003.x
- Sanders, E., & Stappers, P.J. (2008). Co-creation and the new landscapes of design. *CoDesign*, 4(1), 5-18. doi: 10.1080/15710880701875068
- Sato, S., Lucente, S., Meyer, D., & Mrzaek, D. (2010). Design thinking to make organization change and development more responsive. *Design Management Review*, 21(2), 45-52. doi:10.1111/j.1948-7169.2010.00064.x
- Schon, D. (1983). *The reflective practitioner: how professionals think in action*. New York: Basic Books.
- Second Road. (2011). About us. Retrieved February 10, 2011, from <http://secondroad.com.au/Dynamicpages.asp?cid=2&navid=2>.
- Second Road. (2013). What is the 'second road'? Retrieved March 23, 2013, from http://www.secondroad.com.au/about_us/
- Second Road. (2014). Home page. Retrieved 26 July, 2014, from <http://www.secondroad.com.au>
- Seidel, V. P., Fixson, S. K., Information, M., College, B., Ha, T., & Park, B. (2013). Adopting “design thinking” in novice multidisciplinary teams: The application and limits of design methods and reflexive practices. *Product Innovation Management*, 30(S1), 19-33. doi: 10.1111/jpim.12061
- Seelos, C., & Mair, J. (2005). Social entrepreneurship: Creating new business models to serve the poor. *Business Horizons*, 48(3), 241-246. doi: 10.1016/j.bushor.2004.11.006
- Sevaldson, B. (2011). *Giga-mapping: Visualisation for complexity and systems thinking in design*. Paper presented at the Nordic Design Research Conference, Helsinki, Finland.
- Silverman, D. (1998). Qualitative research: Meanings or practices? *Information Systems Journal*, 8(1), 3-20. doi: 10.1046/j.1365-2575.1998.00002.x
- Simon, H. (1969). *The sciences of the artificial*. Cambridge, Mass.: MIT Press.
- Simon, H. (1996). *The sciences of the artificial* (3rd ed.). Cambridge, Mass.: MIT Press.
- Smith, J. (2004). Reliability and validity in qualitative research. In M. Lewis-Beck, S., A. Bryman & T. Futing Liao (Eds.), *The SAGE Encyclopedia of Social Science Research Methods* (pp. 958-959). Thousand Oaks, CA: Sage Publications.

- Sobel, L., & Groeger, L. (2012). Design thinking: Exploring opportunities for the design industry and business in Australia. *Macquarie Graduate School of Management (MGSM) Research Paper Series 952-2012*: Macquarie Graduate School of Management. Retrieved from http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2194672
- Sobel, L., & Groeger, L. (2013). The future of design thinking in Australia. *Design Management Review*, 24(2), 26-31. doi: 10.1111/drev.10237
- Stanford University. (2010). D.School Bootcamp Bootleg. Retrieved from <http://dschool.stanford.edu/wp-content/uploads/2011/03/BootcampBootleg2010v2SLIM.pdf>
- Stake, R.E. (1978). The case study method in social inquiry. *Educational Researcher*, 7(2), 5-8.
- Stoecker, R. (1991). Evaluating and rethinking the case study. *Sociological Review*, 39(1), 88-112. doi: 10.1111/1467-954X.ep5476157
- Stolterman, E. (2008). The nature of design practice and implications for interaction design research. *International Journal of Design*, 2(1), 55-65. Retrieved from: <http://www.ijdesign.org/>
- Suchman, L. (1987). *Plans and Situated Actions : The Problem of Human-Machine Communication (Learning in Doing: Social, Cognitive & Computational Perspectives)*. Cambridge, UK: Cambridge University Press.
- Sundin, O., & Johannisson, J. (2005). Pragmatism, neo-pragmatism and sociocultural theory: communicative participation as a perspective in LIS. *Journal of Documentation*, 61(1), 23-43. doi: 10.1108/00220410510577998
- Tashakkori, A, & Creswell, J. (2007). The new era of mixed methods. *Journal of Mixed Methods Research*, 1(1), 3-8. doi: 10.1177/2345678906293042
- Trafford, V., & Leshem, S. (2008). *Stepping stones to achieving your doctorate: Focusing on your Viva from the start*. Berkshire, England: Open University Press.
- Tversky, A., & Kahneman, D. (1986). Rational choice and the framing of decisions. *The Journal of Business*, 59(4), S251-S278. doi: 10.1086/296365
- Vaajakallio, K., & Mattelmäki, T. (2007). *Collaborative design exploration: Envisioning future practices with Make Tools*. Paper presented at the Designing Pleasurable Products and Interfaces, Helsinki, Finland.
- Van Maanen, J. (1988). *Tales of the field: On writing ethnography*. Chicago: University of Chicago Press.
- Verganti, R. (2009). *Design driven innovation: Changing the rules of competition by radically*

- innovating what things mean*. Boston, MA: Harvard University Press.
- Walford, G. (2009). The practice of writing ethnographic fieldnotes. *Ethnography and Education*, 4(2), 117-130. doi: 10.1080/17457820902972713
- Walsham, G. (1996). Interpretive case studies in IS research: Nature and method. *European Journal of Information Systems*, 4, 74-81. Retrieved from: <http://www.palgrave-journals.com/ejis/index.html>
- Ward, A., Runcie, E., & Morris, L. (2009). Embedding innovation: Design thinking for small enterprises. *Journal of Business Strategy*, 30(2/3), 78-84. doi: 10.1108/02756660910942490
- Yin, R. (1994). *Case study research: design and methods* (2nd ed.). Thousand Oaks, CA.: SAGE publications.
- Yin, R. (2003). *Case study research: design and methods* (3rd ed.). Thousand Oaks, CA.: SAGE Publications.
- Yin, R. (2009). *Case study research : design and methods* (4th ed.). Thousand Oaks, CA.: SAGE publications.
- York, M., Wicks-Green, O., & Golsby-Smith, T. (2010). *Cultural transformation : 20 years of 'Design thinking' at the Australian Taxation Office : Some reflections on the journey*. In K. Dorst, S. Stewart, I. Staudinger, B. Paton & A. Dong (Eds.). *Proceedings of the 8th Design Thinking Research Symposium (DTRS8)*.

Appendix 1: Ethical clearances

Second Road case study clearance & extension:
SUHREC project 2010/228

Second Road case study clearance:
SUHREC project 2011/009

Expert interview study clearance:
SUHREC project 2011/061

Deloitte case study clearance:
SUHREC project 2011/098

Note: All conditions pertaining to ethical clearances were properly adhered to throughout this research project. All annual and final reports have been submitted.

SUHREC Project 2010/228 Ethics Clearance

Kaye Goldenberg <KGOLDENBERG@groupwise.swin.edu.au>

29 October 2010 12:59

To: Gavin Melles <GMelles@groupwise.swin.edu.au>

Cc: rmosel@swin.edu.au

To: Dr Gavin Melles, Design/ Ms Zaana Jacklyn Howard
[BC: Ms Zaana Jacklyn Howard]

CC: Ms Rachel Mosel, Research Admin. Co-ordinator, Design

Dear Dr Melles,

SUHREC Project 2010/228 Redesigning the organisation as an adaptive social ecosystem

Dr Gavin Melles, Design/ Ms Zaana Jacklyn Howard

Approved Duration: 29/10/2010 To 31/01/2011 [Adjusted]

I refer to the ethical review of the above project protocol undertaken on behalf of Swinburne's Human Research Ethics Committee (SUHREC) by SUHREC Subcommittee (SHESC4) at a meeting held on 24 September 2010. Your responses to the review received on 4, 12, 13, 26 and 28 October were put to a nominated SHESC4 delegate for review.

I am pleased to advise that, as submitted to date, the project has approval to proceed in line with standard on-going ethics clearance conditions here outlined.

- All human research activity undertaken under Swinburne auspices must conform to Swinburne and external regulatory standards, including the National Statement on Ethical Conduct in Human Research and with respect to secure data use, retention and disposal.

- The named Swinburne Chief Investigator/Supervisor remains responsible for any personnel appointed to or associated with the project being made aware of ethics clearance conditions, including research and consent procedures or instruments approved. Any change in chief investigator/supervisor requires timely notification and SUHREC endorsement.

- The above project has been approved as submitted for ethical review by or on behalf of SUHREC. Amendments to approved procedures or instruments ordinarily require prior ethical appraisal/ clearance. SUHREC must be notified immediately or as soon as possible thereafter of (a) any serious or unexpected adverse effects on participants and any redress measures; (b) proposed changes in protocols; and (c) unforeseen events which might affect continued ethical acceptability of the project.

- At a minimum, an annual report on the progress of the project is required as well as at the conclusion (or abandonment) of the project.

- A duly authorised external or internal audit of the project may be undertaken at any time.

Please contact me if you have any queries about on-going ethics clearance. The SUHREC project number should be quoted in communication. Chief Investigators/Supervisors and Student Researchers should retain a copy of this e-mail as part of project record-keeping.

Best wishes for the project.

Yours sincerely

<https://mail.google.com/mail/u/0/?ui=2&ik=368611f49d&view=pt&q=KGOLDENBERG%40groupwise...>

1/2

SUHREC Project 2010/228 Ethics Clearance for Extension of Duration of Protocol

1 message

Kaye Goldenberg <KGOLDENBERG@groupwise.swin.edu.au>
To: Gavin Melles <GMelles@groupwise.swin.edu.au>
Cc: Rachel Mosel <RMOSEL@groupwise.swin.edu.au>

25 March 2011 10:05

To: Dr Gavin Melles, Design/ Ms Zaana Jacklyn Howard
[BC: Ms Zaana Jacklyn Howard]

CC: Ms Rachel Mosel, Research Admin. Co-ordinator, Design

Dear Dr Melles,

SUHREC Project 2010/228 Redesigning the organisation as an adaptive social ecosystem

Dr Gavin Melles, Design/ Ms Zaana Jacklyn Howard

Approved Duration: 29/10/2010 To 31/01/2011 [Adjusted]

Project Extension to: 01/07/2011

Thank you for your progress report for the above project received on 23 March 2011 which included a request for an extension of duration.

There being no change to the protocol as revised and approved to date, I am authorised to issue an extension of ethics clearance in line with standard on-going ethics clearance conditions previously communicated and reprinted below.

Please contact the Research Ethics Office if you have any queries about on-going ethics clearance, citing the SUHREC project number. Copies of clearance e-mails should be retained as part of project record-keeping.

Best wishes for the continuing project.

Yours sincerely,

Kaye Goldenberg

for Keith Wilkins

Research Ethics Officer

[Kaye Goldenberg](#)

Administrative Officer (Research Ethics)

Swinburne Research (H68)

Swinburne University of Technology

P O Box 218

HAWTHORN VIC 3122

Tel [+61 3 9214 8468](tel:+61392148468)

Fax [+61 3 9214 5267](tel:+61392145267)

>>> Kaye Goldenberg 29/10/2010 1:59 PM >>>

To: Dr Gavin Melles, Design/ Ms Zaana Jacklyn Howard
[BC: Ms Zaana Jacklyn Howard]

<https://mail.google.com/mail/u/0/?ui=2&ik=368611f49d&view=pt&q=KGOLDENBERG%40groupwise...>

1/2

SUHREC Project 2011/009 Ethics Clearance

1 message

Resethics <Resethics@groupwise.swin.edu.au>

25 February 2011 11:41

To: zaanahoward@gmail.com, Gavin Melles <GMelles@groupwise.swin.edu.au>

Cc: Kaye Goldenberg <KGOLDENBERG@groupwise.swin.edu.au>, Rachel Mosel <RMOSEL@groupwise.swin.edu.au>

To: Dr Gavin Melles/Ms Zaana Jaclyn Howard, Design

Dear Gavin and Zaana

SUHREC Project 2011/009 Redesigning the organisation as an adaptive social ecosystem

Dr Gavin Melles, Design; Ms Zaana Jaclyn Howard

Approved Duration: 25/02/2011 To 25/01/2012 [Adjusted]

I refer to the ethical review of the above project protocol undertaken on behalf of Swinburne's Human Research Ethics Committee (SUHREC) by a SUHREC Subcommittee (SHESC1) at its meeting held 11 February 2011. Your responses to the review as e-mailed on 20 February 2011 were forwarded to a SHESC1 delegate for consideration. You will have noted separate feedback from the delegate emailed to you re participant interaction.

I am pleased to advise that, as submitted to date, the project may proceed in line with standard on-going ethics clearance conditions here outlined.

- All human research activity undertaken under Swinburne auspices must conform to Swinburne and external regulatory standards, including the current *National Statement on Ethical Conduct in Human Research* and with respect to secure data use, retention and disposal.

- The named Swinburne Chief Investigator/Supervisor remains responsible for any personnel appointed to or associated with the project being made aware of ethics clearance conditions, including research and consent procedures or instruments approved. Any change in chief investigator/supervisor requires timely notification and SUHREC endorsement.

- The above project has been approved as submitted for ethical review by or on behalf of SUHREC. Amendments to approved procedures or instruments ordinarily require prior ethical appraisal/ clearance. SUHREC must be notified immediately or as soon as possible thereafter of (a) any serious or unexpected adverse effects on participants and any redress measures; (b) proposed changes in protocols; and (c) unforeseen events which might affect continued ethical acceptability of the project.

- At a minimum, an annual report on the progress of the project is required as well as at the conclusion (or abandonment) of the project.

- A duly authorised external or internal audit of the project may be undertaken at any time. Please contact the Research Ethics Office if you have any queries about the ethical review process undertaken. The SUHREC project number should be quoted in communication.

Yours sincerely

Keith Wilkins for
Kaye Goldenberg
Secretary, SHESC1

<https://mail.google.com/mail/u/0/?ui=2&ik=368611f49d&view=pt&q=KGOLDENBERG%40groupwise...>

1/2

SUHREC Project 2011/061 Ethics Clearance

1 message

Kaye Goldenberg <KGOLDENBERG@groupwise.swin.edu.au>

29 April 2011 15:51

To: Gavin Melles <GMelles@groupwise.swin.edu.au>

Cc: Rachel Mosel <RMOSEL@groupwise.swin.edu.au>

To: Dr Gavin Melles, Design/Ms Zaana Jacklyn Howard
[BC: Ms Zaana Jacklyn Howard]

Dear Dr Melles,

2011/061 Redesigning the organisation as an adaptive social ecosystem

Dr Gavin Melles, Design/Ms Zaana Jacklyn Howard

Approved Duration: 29/04/2011 To 29/04/2012 [Adjusted]

I refer to the ethical review of the above project protocol undertaken on behalf of Swinburne's Human Research Ethics Committee (SUHREC) by SUHREC Subcommittee (SHESC4) at a meeting held on 8 April 2011. Your response to the review as e-mailed on 18 April 2011 were put to a nominated SHESC4 delegate for review.

I am pleased to advise that, as submitted to date, the project has approval to proceed in line with standard on-going ethics clearance conditions here outlined.

- All human research activity undertaken under Swinburne auspices must conform to Swinburne and external regulatory standards, including the National Statement on Ethical Conduct in Human Research and with respect to secure data use, retention and disposal.

- The named Swinburne Chief Investigator/Supervisor remains responsible for any personnel appointed to or associated with the project being made aware of ethics clearance conditions, including research and consent procedures or instruments approved. Any change in chief investigator/supervisor requires timely notification and SUHREC endorsement.

- The above project has been approved as submitted for ethical review by or on behalf of SUHREC. Amendments to approved procedures or instruments ordinarily require prior ethical appraisal/ clearance. SUHREC must be notified immediately or as soon as possible thereafter of (a) any serious or unexpected adverse effects on participants and any redress measures; (b) proposed changes in protocols; and (c) unforeseen events which might affect continued ethical acceptability of the project.

- At a minimum, an annual report on the progress of the project is required as well as at the conclusion (or abandonment) of the project.

- A duly authorised external or internal audit of the project may be undertaken at any time.

Please contact me if you have any queries about on-going ethics clearance. The SUHREC project number should be quoted in communication. Chief Investigators/Supervisors and Student Researchers should retain a copy of this e-mail as part of project record-keeping.

Best wishes for the project.

Yours sincerely

Kaye Goldenberg

<https://mail.google.com/mail/u/0/?ui=2&ik=368611f49d&view=pt&q=KGOLDENBERG%40groupwise...>

1/2

SUHREC Project 2011/098 Ethics Clearance

2 messages

Kaye Goldenberg <KGOLDENBERG@groupwise.swin.edu.au>
To: Gavin Melles <GMelles@groupwise.swin.edu.au>

10 June 2011 16:39

To: Dr Gavin Melles, Design/Ms Zaana Jaclyn Howard
[BC: Zaana Jaclyn Howard]

Dear Dr Melles,

SUHREC Project 2011/098 Redesigning the organisation as an adaptive social ecosystem

Dr Gavin Melles, Design/Ms Zaana Jaclyn Howard
Approved Duration: 10/06/2011 To 10/06/2012 [Adjusted]

I refer to the ethical review of the above project protocol undertaken on behalf of Swinburne's Human Research Ethics Committee (SUHREC) by SUHREC Subcommittee (SHESC4) at a meeting held on 20 May 2011. Your response to the review as e-mailed on 29 May 2011 was put to a nominated SHESC4 delegate for review.

I am pleased to advise that, as submitted to date, the project has approval to proceed in line with standard on-going ethics clearance conditions here outlined.

- All human research activity undertaken under Swinburne auspices must conform to Swinburne and external regulatory standards, including the National Statement on Ethical Conduct in Human Research and with respect to secure data use, retention and disposal.

- The named Swinburne Chief Investigator/Supervisor remains responsible for any personnel appointed to or associated with the project being made aware of ethics clearance conditions, including research and consent procedures or instruments approved. Any change in chief investigator/supervisor requires timely notification and SUHREC endorsement.

- The above project has been approved as submitted for ethical review by or on behalf of SUHREC. Amendments to approved procedures or instruments ordinarily require prior ethical appraisal/ clearance. SUHREC must be notified immediately or as soon as possible thereafter of (a) any serious or unexpected adverse effects on participants and any redress measures; (b) proposed changes in protocols; and (c) unforeseen events which might affect continued ethical acceptability of the project.

- At a minimum, an annual report on the progress of the project is required as well as at the conclusion (or abandonment) of the project.

- A duly authorised external or internal audit of the project may be undertaken at any time.

Please contact me if you have any queries about on-going ethics clearance. The SUHREC project number should be quoted in communication. Chief Investigators/Supervisors and Student Researchers should retain a copy of this e-mail as part of project record-keeping.

Best wishes for the project.

Yours sincerely

Kaye Goldenberg
Secretary, SHESC4

<https://mail.google.com/mail/u/0/?ui=2&ik=368611f49d&view=pt&q=KGOLDENBERG%40groupwise...>

1/2

Appendix 2: Research publication list

Howard, Z. (2012). *From concept to capability: developing design thinking within a professional services firm*. Paper presented at Design Research Society Conference (DRS), Chulalongkorn University, Bangkok, Thailand.

Howard, Z. (2012). *A conversation approach to business model innovation*. Paper presented at PIN-C 2012: Participatory Innovation Conference, Swinburne University of Technology, Lilydale, Australia.

Howard, Z. & Davis, K. (2011). From solving puzzles to designing solutions: Integrating design thinking into evidence based practice. *Evidence Based Library and Information Practice*, 6(4), 15-21. Retrieved from:
<http://ejournals.library.ualberta.ca/index.php/EBLIP/index>

Howard, Z. & Melles, G. (2011). *Beyond designing: roles of the designer in complex design projects*. In D. Stevenson (Ed.), Proceedings of 23rd Australian Computer-Human Interaction (OzCHI) Conference, Canberra, Australia (pp.152-155). doi: 10.1145/2071536.2071560.