

Design Futures: An Investigation into the Role of Futures Thinking in Design

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Martyn Evans, BA (Ravensbourne) MA (Manchester Met)

Abstract

Designers consider the future as an intrinsic aspect of the design process yet, there has been limited academic investigation of the approaches designers employ to create next-next generation products and services. The central aim of this thesis is to investigate the role of futures thinking in design. It draws upon the field of future studies to provide a theoretical base for the research. The research answers three questions: How do designers engage with the future within the design process? What futures thinking methods are employed in the design process? What futures thinking methods do designers employ? Data was collected via semi-structured interviews in the UK and USA with 40+ designers, researchers, and design managers. Six research propositions provide a framework for qualitative data analysis through which a series of theoretical categories and associated substantive factors are identified. Analysis of the research findings supported the development of a design futures framework that communicates a representative picture of the role of future thinking in design, and contributes to understanding the ways in which designers consider the future in the design process. The study identifies the growing need for organisations to engage designers to consider the future within an increasingly complex and competitive product and service developmental landscape.

Acknowledgements

Perhaps it is fitting that this is the final part of my thesis that I write. A long and winding road, it would not have been possible without...

I would like to express my deepest thanks to Professor Rachel Cooper who as my supervisor provided me with the freedom, support, and confidence to undertake this research. Her ability to cut straight to the chase is something that I will both aspire to, and appreciate, for many years to come. Thank you boss!!! One day I hope to be able to understand her writing. I would also like to thank Dr Leon Cruickshank for his insight and ability to take the long view on things. He provided a counter perspective that helped me to step away from the detail and see the big picture.

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Declaration

I declare that this thesis is my own work and has not been submitted in substantially the same form for the award of a higher degree elsewhere. To the best of my knowledge it does not contain any materials previously published or written by another person except where due reference is made in the text.

.....
Martyn Evans

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01

Introduction: Thesis aims and scope of study

1.0 Introduction

This thesis documents an investigation into the role of futures thinking in design and the development of a design futures framework which reveals and communicates the role of futures thinking in design. This chapter sets out the background to the research. It explains why this area of study was chosen and what the thesis aims to achieve. The chapter also gives a brief overview of the content of the thesis to assist the reader to navigate through the material.

Specifically, this chapter outlines the background to the research (sec.1.1), motivation for the research (sec.1.2), the research problem (sec.1.3), the focus of the research (sec.1.4), the structure of the thesis (sec.1.5), and concludes with a summary of the chapter (sec.1.6).

1.1 Background to the research

Looking to the future is not easy because it is hard to acquire knowledge about the future (van der Duin, 2008)

Understanding the future is important to design. Designers look into the future and attempt to envisage products and services that are required, desired, and suitable for the needs of the user and the environment they occupy (Pilditch & Scott, 1965; Dreyfuss 1967; Pilditch, 1976 & 1987; Walsh et al, 1992; Hollins & Hollins, 1999; Keinonen, 2005; Rodriguez Ramirez et al, 2005; Margolin, 2007). The predictions designers make about the future are an important part of the design process (Cross, Elliot & Roy; 1975; Lawson, 1997; Krippendorff, 2006; Pillkahn, 2008). Designers' ability to envision and interpret possible social, cultural, technological and economic futures is crucial to the success of design activities (Woudhuysen, 1990 & 2006; Blaich & Blaich, 1993; Marseille

& Roos, 2005; Verganti, 2009). Yet, despite the wealth of futures thinking approaches evident within many disciplines, literature on the use of futures thinking in design is scarce (Evans, 2003; Rodriguez Ramirez et al, 2005). The exact manner in which designers consider the future within the design and development process has received limited attention in academic literature. In an increasingly complex and competitive development landscape, organisations are continually trying to identify how to design and develop successful future products and services (Topalian, 1980; Walsh et al, 1992; Urban & Hauser, 1993; Cooper & Press, 1995; Hollins & Hollins, 1999; Cooper, 2001; von Stamm, 2003 & 2008; Borja de Mozota, 2003; McGrath, 2004; Stefik & Stefik, 2005; Verganti, 2009; Richardson, 2010).

1.2 Motivation for the research

The motivation for this research comes from three main areas: i) as a trained product designer, the author has engaged with future oriented design projects for over a decade, and as such wanted to develop an empirically based understanding of this area, ii) the limited academic research in the area of design led futures means that there is a limited theoretical base, especially coming out of the design practice field, related to the focus of this research, and iii) the desire to develop an understanding of the manner in which designers consider the future such that this can subsequently inform design practice.

The author is a trained product designer who spent time working in industry prior to entering higher education as a product design lecturer in 1999. Design industry experience enabled the development and application of a range of product design skills, predominately in the medical products sector. Due to the various demands placed upon a higher education lecturer, the author had limited opportunity to practice and apply practical design skills on a daily basis and as such sought to develop complementary research activities to ensure a level of currency in design was maintained. The development of an academic research interest in design futures was a gradual process over a three to four year period after becoming a lecturer. Future oriented student design projects with external organisations, such as Samsung and Unilever, across a range of product sectors were supervised and led by the author. This approach provided an opportunity to explore real world issues through a design futures lens and help to establish a focus for subsequent academic research. This ultimately resulted in the research contained within this thesis. By engaging with organisations who wanted to develop a clear and rigorously researched vision of the future, the author identified the limited academic (and industry) research within this area. This provided evidence that there was a clear demand for design-led futures within industry but little empirical research had been published.

An initial and predominately tacit understanding of the approaches utilised by designers to explore and consider the future was achieved through decisions with various designers, design researchers, and design managers prior to commencing this PhD. This

understanding formed the basis for the research contained within this thesis. Over the last decade the author has developed a range of research skills and interests that are built upon their design training and industry experience. In doing so, they have sought to develop research that has potential to be applied in, and relevant to, design practice. This has helped to inform the various decisions made while undertaking the research within this study and as such is included within this introduction to help the reader contextualise the research.

1.3 The research problem

There's nothing on the planet that can't be made just that bit better. But before you do it, you need to have an idea of where you want this to go eventually, a vision of the future, with a set of stepping stones to let you get from the now into the future in an effective and efficient way. (Seymour, 2008)

It is difficult to conduct market research upon tomorrow's technology driven products and services, because asking potential users if they consider a certain approach to be a good idea is potentially useful, their answers are unlikely to be too revealing (Lowe & Hunter, 1991; Ireland & Johnson, 1995; Johnson & Masten 1998; Bruce & Cooper, 1997; Margolin, 2007; von Stamm, 2008). People have very little experience of what they may encounter in the next few years and their answers are usually based upon what they understand today (Hollins & Hollins, 1999; Brown, 2009). Woudhuysen (1990, 1992 & 2006) affirms that this is a continued problem in both design and futures research. Loewy (1951) captured with his MAYA concept (most advanced yet acceptable), a key challenge designer's face – the development of the most technically advanced product (or service) that is possible while ensuring that this is acceptable with consumers in the marketplace.

The research problem that this thesis addresses is that *we don't really understand how designers consider the future within the design process while creating desirable and acceptable next-next generation products and services, thus we are unable to explain this approach and take advantage of it.*

A core aspect of this problem requires designers to engage with the conceptualisation, research, design, development, and communication of future products and services. They need to link the future with the present, and the present with the future through the application of their creative and intellectual skills, and create tangible and believable visions of the future. As Cross, Elliot and Roy powerfully assert

Visions of the future are particularly important for designers, because designers have to imagine both the future conditions that will exist when their designs actually come into use and how those conditions will be changed by the creation of their new design. (Cross, Elliot & Roy, 1975)

This claim is now more than a third of a century old but is increasingly relevant to design in the sustainability-challenged, technology-driven, complexity-dominated, post-convergent 21st century.

1.4 The focus of the research

The central aim of this thesis is to investigate the role of futures thinking in design. It aims to address the research problem (sec.1.3) through the interrogation of three research questions:

- RQ01: How do designers engage with the future within the design process?
- RQ02: What futures thinking methods are employed in the design process?
- RQ03: What futures thinking methods do designers employ?

The above research questions were formalised from a tacit understanding of the future oriented design process obtained as a designer. The development of these questions occurred before the literature review contained within this thesis was conducted but was based upon published work undertaken by the author in the field (sec.1.6.1). Thus these questions were based upon understanding of design practice (gained while being a designer) and through academic research (gained from researching and publishing in the field).

The literature review provided a theoretical understanding of approaches to anticipating the future, and how design engages with these approaches. Two main sources of literature were used for the review: (i) literature from the field of future studies (the interdisciplinary field of social enquiry concerned with the study of yesterday's and today's changes with the intention of anticipating the future); and (ii) literature from the field of design (both theory and practice perspectives). The literature provided a theoretical base for the development of six research propositions (see chapter 02):

- RP01: Designers consider the future as an intrinsic aspect of the design process
- RP02: Designers use futures thinking approaches within the design process
- RP03: There are no commonly accepted approaches in futures thinking in the design discipline
- RP04: Designers appropriate futures thinking methods and techniques from other areas and augment them to support design activity
- RP05: External agencies provide future based knowledge for designing
- RP06: Futures thinking approaches are increasingly being employed in design

The research propositions were developed to enable the interrogation of the research questions and provide a structure to data collection and analysis. The research propositions were used to guide and structure much of the research contained within this

thesis and, the extent to which these research propositions were supported, or not, by the research findings was used as an element to inform the conclusions.

A qualitative research approach was adopted involving semi-structured interviews with experts from appropriate design fields. Analysis of research findings informed the development of a design futures framework that, through iterative development, validation, and refinement, reveals the role of futures thinking in design. This framework provides a mechanism to communicate the role of futures thinking in design and frame how designers think about the future within the design process.

This section has detailed the focus of the research contained within this thesis, identified three research questions, and six research propositions. The research questions and research propositions guided the research conducted within this study, and provided a mechanism to structure and conceptualise the research findings. The next section will briefly outline the structure of this thesis.

1.5 The structure of the thesis

This section summarises the structure of this thesis. The thesis has six chapters that are linked as shown in Fig.1.1.

Chapter 01 (Introduction: Thesis Aims and Scope of Study) sets out the background to the research contained within this thesis. It explains why this area of study was chosen and what the thesis aims to achieve. The chapter also gives a brief overview of the content of the thesis.

Chapter 02 (Literature Review) presents a literature review of approaches to anticipating the future, and how design engages with these approaches. Challenges to anticipating the future and the measures undertaken to attempt to cope with the increasing technological and social change are discussed. This chapter also identifies the link between the research propositions and the literature.

Chapter 03 (Research Methodology) contains a detailed discussion of the research methods available, the theoretical basis behind these approaches, and a justification of the actual methods employed. It investigates the possible ways of solving the research questions and linked propositions by investigating the means by which other research methods have been deployed. It concludes with a description of the chosen set of methods and the manner in which they were employed.

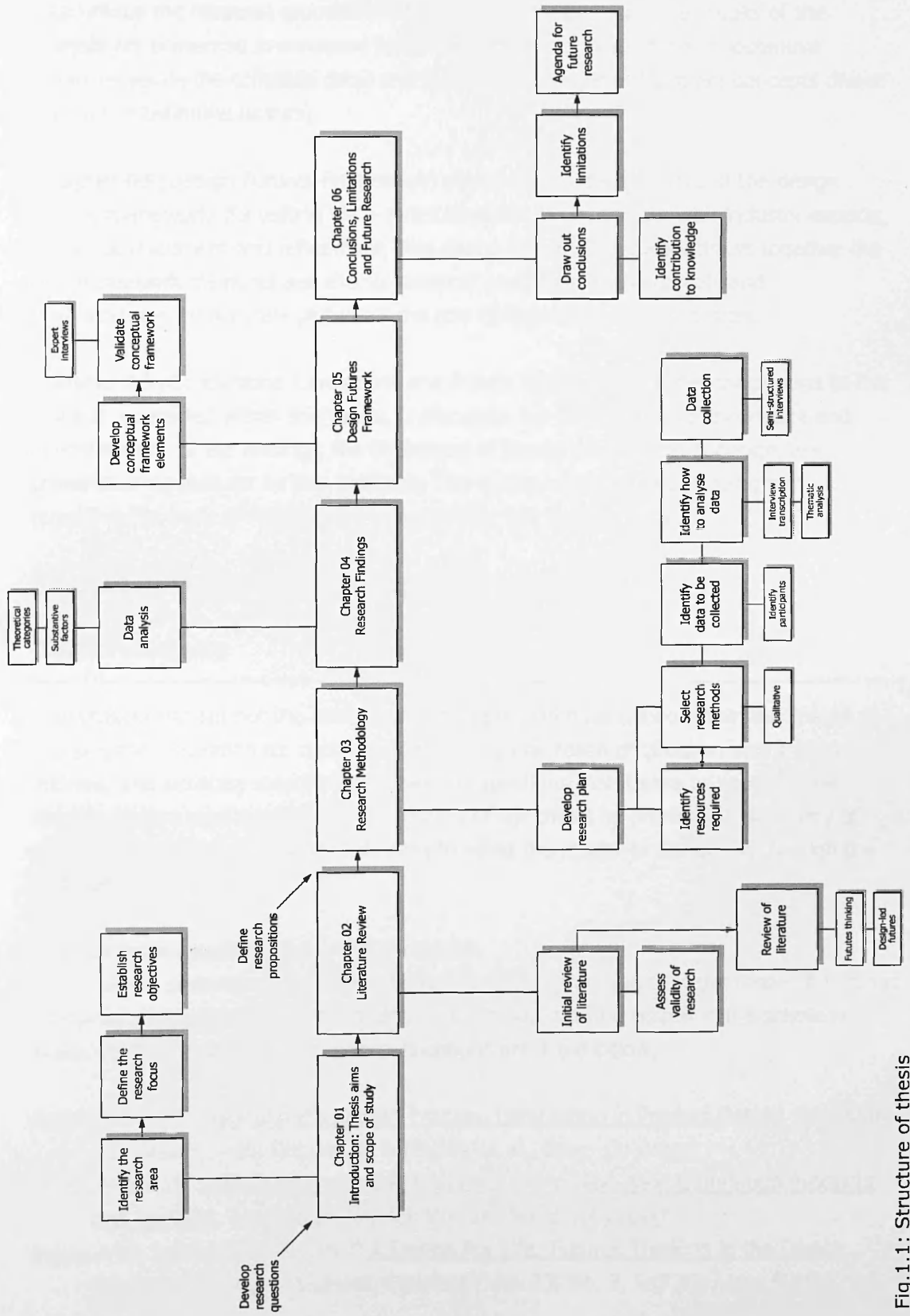


Fig. 1.1.: Structure of thesis

Chapter 04 (Research Findings) presents analysis of the research data collected through a series of semi-structured interviews conducted with research and design experts. The data utilises the research propositions to structure the analysis. The results of the analysis are presented in summary form through substantive factors (substantive instances within the collected data) and theoretical categories (abstract concepts drawn from the substantive factors).

Chapter 05 (Design Futures Framework) describes the development of the design futures framework, it's testing via a series of validation interviews with industry experts, and its development and refinement. The design futures framework draws together the four framework elements and the six research propositions and reveals and communicates an accurate picture of the role of futures thinking in design.

Chapter 06 (Conclusions, Limitations and Future Research) provides conclusions to the research contained within this thesis. It discusses the contribution to knowledge and interpretations of the findings, the limitations of the adopted research design, and presents an agenda for further research. The chapter ends with concluding remarks regarding the body of research contained within this thesis.

The thesis concludes with bibliographic information and appendices.

1.6 Chapter summary

This chapter has set out the background to the research contained within this thesis. It explains the motivation for conducting this study, the research problem that it aims to address, and explicitly identified the research questions that it aims to answer. The chapter gives a brief overview of the content of the thesis by providing a summary of each chapter contained herein. This aims to assist the reader in navigating through the material presented.

1.6.1 Publications resulting from this research

The research undertaken for this thesis has disseminated aspects of the research findings demonstrating that the author has already contributed to the corpus in the scholarly arena. Published work and *in press* publications are listed below:

Evans, M (2012) Color and the Design Process: Forecasting in Product Design. In: Color and Design, (eds) DeLong, M & Martinson, B., Berg. (*in press*)

Evans, M (2011) Empathising with the Future: Creating Next-Next Generation Products and Services. The Design Journal. Vol. 14, No. 3. (*in press*)

Evans, M & Sommerville, S (2007) A Design For Life: Futures Thinking in the Design Curriculum. Futures Research Quarterly. Vol. 23, No. 3, Fall 2007, pp. 5-20.

- Evans, M & Sommerville, S (2007) Design Led Futures: Futures Thinking in the Design Curriculum. Connected 2007: International Conference On Design Education, University Of New South Wales, Sydney, Australia, July 2007.
- Cooper, R & Evans, M (2006) Breaking From Tradition: Market Research, Consumers Needs and Design Futures. Design Management Review. Vol. 17, No. 1, Winter 2006, pp.68 -74.
- Evans, M & Sommerville, S (2006) Cross-cultural Universals: A Framework for Design Futures. Design and Emotion Conference 2006, Chalmers University of Technology, Gothenburg, Sweden, September 2006.
- Evans, M & Sommerville, S (2006) Educating the Future. 8th Engineering & Product Design Education International Conference, Salzburg University of Applied Sciences, Salzburg, Austria, September 2006.

02

Literature Review

2.0 Introduction

This chapter presents a literature review of approaches to anticipating the future, and how design engages with these approaches. Challenges to anticipating the future are discussed and the measures undertaken to attempt to cope with the increasing technological and social change are identified. Design is presented as a prospective activity in which, as Krippendorff (2006) argues, 'designers most outstanding activity is not being afraid to explore new ideas, to challenge theories that claim that something cannot be done, or to question what is commonly taken for granted'.

Two main sources of literature were used for this review: (i) literature from the field of future studies (the interdisciplinary field of social enquiry concerned with the study of yesterday's and today's changes with the intention of anticipating the future); and (ii) literature from the field of design (both theory and practice perspectives). The nature of the literature under review presented three key challenges:

- *The breadth of literature in the field of future studies:* A broad review of the key concepts of future studies was conducted develop an understanding of the field and help to identify studies appropriate to the aim of this thesis.
- *The broad scope of literature in the field of design:* The breadth and depth of literature in design is vast and as such a focussed literature review was required to contextualise the focus of this research.
- *Limited literature available upon the interface between future studies and design:* This can be attributed to:
 - Limited academic consideration of the interaction of these two fields as much of this activity has been undertaken in design practice rather than academic design research.

- Commercial sensitivities mean that organisations often do not wish to disclose their approaches to avoid loss of what they perceive as competitive advantage.

Addressing these challenges enabled the development of a map that sets out the scope and extent of this review, and provides a route map to overall area of concern. The 'Literature Scope and Area of Concern' chapter map provides an overview of the structure of this literature review. In addition to this Introduction (section 2.0), this chapter constitutes three main elements:

1. *Futures Thinking* (sections 2.1 to 2.3): A detailed examination of the future and futures studies are introduced providing an introduction to this interdisciplinary field of social enquiry. The growing need for futures studies as a result of rapid, ever increasing change in contemporary society is discussed. Section 2.1 sets out the concept of the future as events yet to occur, the opposite of the past, and the time after the present. Section 2.2 presents the key concepts of futures thinking. Section 2.3 details scenarios - the archetypical product of futures studies.
2. *Design Context: Theory and Practice* (section 2.4): Like futures thinking, the field of design is vast and would require a substantial discourse to examine all of its areas in detail. This section provides a meta-level overview of design as both a discipline and an activity. It presents design as a prospective activity and contextualises the focus design in relation to this research.
3. *Design Futures* (sections 2.5 to 2.8): Literature detailing future focussed design approaches and activities is presented in four sections. Section 2.5 summarises how design engages with trends, socio-cultural dynamics and the role of people as catalysts for innovation. Section 2.6 details design's use of experimentation to explore new directions. Section 2.7 sets out the manner in which design explorations communicate the manifestations of future focussed design activity and the role of product concepting in design led futures. Section 2.8 presents case studies of how design practice engages with future focussed design activities.

The chapter concludes with a discussion of the relationship between future studies and design (section 2.9).

Whilst the above maps out the scope of the literature review, it is important to contextualise the broader context and drivers of the research, namely:

- Rapid social and technological change and its impact upon design, design research, and design practice
- A growing demand for future focussed design methodologies, particularly in contemporary design practice
- Lack of resources for designers when undertaking future focussed design activities

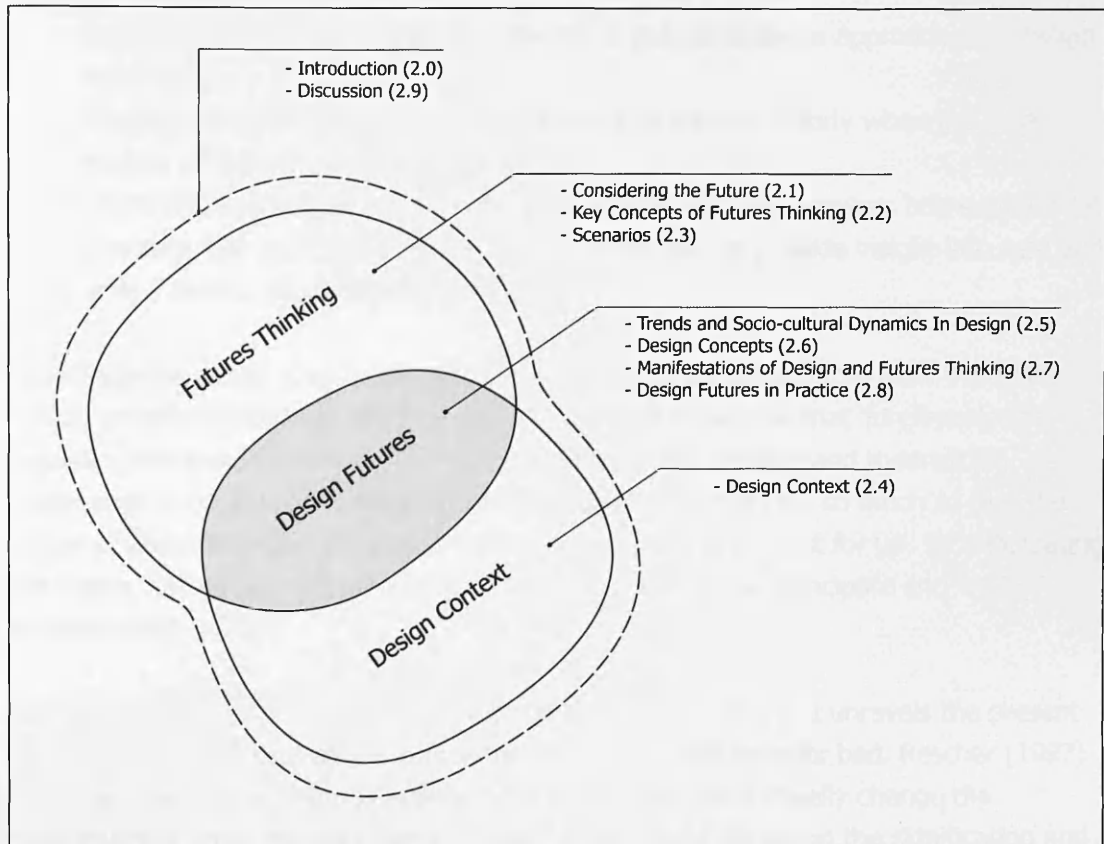


Fig. 2.1 Literature Scope and Area of Concern chapter map

The above factors will be explored in more detail later in this chapter but it should be noted that they contribute to the development of an environment where new forms of design and designers are emerging who can undertake future focussed design projects (Krippendorff, 2006; Margolin, 2007); who are able to synthesise information from a seemingly endless and constantly growing resource pool (Raymond, 2003, Kelley & Littman, 2004 & 2006); and translate this into a form that is valuable in the design process (Kelley & Littman, 2006; Myerson, 2004; Redhead, 2004). Furthermore, future focussed design practice is able to create tangible *visions of the future* that enable viewers to engage with, and respond to their prospective future lives (Laurel, 2003; Marzano, 2005b; Green, 2007). The resultant interactions can then be used as feedback into subsequent design activity (Margolin, 2007; Coughlan & Prokopoff, 2004; Brown, 2005).

The question of why undertake this study, and who is it of relevance to will now be briefly considered. Asking who will benefit from potential outcomes from this study helps to inform the question of why undertake this study (particularly the nature and scope of the literature review). It is anticipated that the beneficiaries of this research will be:

- Design practitioners who undertake, or wish to undertake, future focussed design activities

- Design researchers who wish to understand and disseminate approaches to design led futures
- Organisations who engage design in various forms, particularly when the time horizon of the concern is extended
- Users who can benefit from the development of products, services and experiential concepts that meet existing needs more effectively, or provide insight into new and unmet needs, wants and desires

Admittedly the above is an incomplete list as the potential benefactors from this research cannot be fully determined at this stage. Rescher (1997) affirms that 'foreknowledge regarding the developments of the future is of immense practical and theoretical importance to us. Human beings have a vast stake in the future – so much so that the option of abstaining from predictive ventures simply does not exist for us'. By anticipating the future, individuals, organisations and nations can plan for, anticipate and accommodate change.

The future matters for us because it both takes away and gives. It unravels the present condition of things, replacing it with something else – be it good or bad. Rescher (1997) adds that 'the future matters because what comes later can radically change the significance of what has gone before. Only the future will decide on the signification and significance of various present activities'.

2.1 Ways of conceptualising the future

The future has received much attention amongst scholars for many centuries. Predicting the future to a greater or lesser extent is an inescapable part of human destiny, where our provision for the future always involves some element of prediction (Schwartz, 1999; Cornish, 2004). Without predictive prevision of the future, our assessment of the present would have to be very different from what it is (Kahn & Wiener, 1967). Rescher (1997) contends that the three most salient facts about the future are: that it does not (yet) exist, that it unavoidably will, and that we do – and can – have only very incomplete information about its nature, let alone achieve control of it.

We need all the help we can get with becoming informed about the future. Our lives are lived in a world whose eventuations all too often lie outside the range of our predictive foresight - a world where chance and chaos, volatility and whim are pervasively present. Our aims and goals, our best laid plans, and indeed our very lives are at the mercy of chance, accident, and unmanageable contingency. The burden of responsible decision making under conditions of radical uncertainty weighs heavily on the human mind and spirit. (Rescher, 1997)

A large part of being human lies in our ability to imagine better futures and make them happen (Ogilvy, 2002; Cornish, 2004, Slaughter, 1996a). Humans consider the future as a core aspect of their existence. The human mind, imagination, and spirit are free to roam at will among a stunning array of different worlds and world-views, past, present

and future (Slaughter, 1996b). Humans have an innate capacity for speculation, foresight, modelling and choosing between alternatives. Visions of the future must be informed by more than the science of what is or an imagination of what might be; visions of the future must also be informed by a sense of what ought to be, claims Ogilvy (1996). List (2005) affirms that the human need for anticipation of the future has developed from the pre-scientific use of prophecy, through numerical forecasting, to the qualitative methods of future studies developed in the late 20th century.

Humans can not only imagine the future, but have memories of the past that can be used to inform the journey (Damasio, 2003). Memories from our past can be passed on to future generations as a knowledge source that allow us to take what we have learned and turn it to the task of improving the future (Ogilvy, 2002).

The human condition can be summed up in the observation that, whereas all experiences are of the past, all decisions are about the future. (Boulding, 1973)

A key aspect of the future is that it will be different from the present (Benford, 2005; Bell, 1996), while Dator (1996) asserts that the common feature of the future is that it is uncertain. Although the future will be different and uncertain, this does not mean that we should not attempt to prepare for it. Coughlan & Prokopoff (2004) claim that we should engage fully with activities that allow us to prepare for the non-preparable, and while supporting this position, Dator (1996) suggests that the fundamental unpredictability of the future does not mean that we should not concern ourselves with it and merely trust in luck, god, or fate. Through engagement with the future we may be able to identify and develop strategies that allow organisations to consider how they may be an integral element of such futures (Lindgren & Bandhold 2003; Johansen, 2007, Rescher, 1997). We can see that scholars claim that the future is important to us, and through considered efforts to engage with it, it may be possible to prepare for the future.

Glenn (2003a) argues that the forces of nature, social and political dynamics, scientific discovery, and technological innovation as largely determining the future. However, as human capacity has evolved, our choices increasingly shape the future. Robinson (2003) provides an expansive overview of what he sees as a shift from viewing the future as *deterministic to probabilistic*.

Prior to the scientific revolution of the 17th century, it was commonly believed, that the future was in some sense pre-ordained, and that it was possible to discover the patterns and regularities that governed human destiny, and that, our destiny was written in the stars, and could be uncovered with the appropriate knowledge. With the emergence of modern science, the focus shifted from a belief in immutable destiny that unfolds according to divine plan to a view that future outcomes are a product of past and present circumstances. On this view, future outcomes are not pre-ordained but depend on historical circumstances, which may be affected by chance or choice. In this sense the future is essentially probabilistic, not deterministic. (Robinson, 2003)

By accepting that the future is not pre-ordained, the more effort spent trying to understand the future, the more possibilities we may be able to shape. In its inaugural edition, *Futures* (a leading international futures studies journal) strongly supports this perspective (Futures, 1969):

The future is no longer regarded as predestined-an existing landscape that will be revealed to us as we travel through it. It is now seen as the result of the decisions, discoveries, and efforts that we make today. The future does not exist, but a limitless number of possible futures can be created. From this mode of thought it is a natural step to the idea of establishing desirable goals towards which we can deliberately work.
(Futures, 1969)

Every time is a time of change, and every future yields its own quota of new and unexpected developments. People are continually confronted with change and our human concern for prediction is largely motivated by a need for reassurance in the face of our uncertain fate (Rescher, 1997).

2.1.1 Research into the future – The Field of Futures Studies

Futures research (or studies) is the complete range of methods that can be utilised to look at the future (Bouwerman & Van der Duin, 2003). Encompassing all types of study concerned with the exploration and analysis of future states (Lindgren & Bandhold, 2003; Bell, 1996), the aim of futures research is to help inform perceptions, alternatives and choices about the future (Amara, 1981). It assists us to understand alternatives or preferences for the future, probable developments and to articulate and work towards a desired future (Bell, 1993 & 1996). Masini (1993) describes futures research as a discipline including all ways of looking into the future. Latterly, Masini (2006) considered futures studies to involve the possibility of looking into the future through a diverse array of levels in order to better understand the changing interrelationships between man, society, and the environment. Masini believes that 'we have to examine the forces that draw us on; otherwise we will think only of that which has been done before, and change will not occur' (Masini, 2006).

Key literature in future studies includes Kahn & Wiener (1967); Toffler (1970); Helmer & Dalkey (1983); Wack (1985); Amara (1981); Slaughter (1995 & 1996a); Masini (1993); Coates (1996); Didsbury (1996); Rescher (1997); Schwartz (1997); Armstrong (2001b); van der Heijden (2004); Cornish (2004); Johansen (2007).

As the systematic study of the future, futures research provides a semi-structured approach to consider and anticipate potential futures (Jonas, 2001). An action-orientated discipline focussed upon change in the world, this field of social inquiry provides a framework of concepts and diverse methodologies that allow a structured consideration of the future and reflects on how today's changes become tomorrow's reality (Morgan, 2003; Fahey & Randall, 1998).

Voros (2005) defines the profession of futures studies not by what it is, but by what it is not:

Futures Studies is not really about prediction, in the common sense of the word as a statement of something that will happen; but that, rather, it is about thinking about, writing about and speaking about what alternative futures-in the wonderfully open plural-might happen. (Voros, 2005:87)

The purpose of futures methodology is to systematically explore, create, and test both possible and desirable futures to improve decisions. It includes analysis of how those conditions might change as a result of the implementation of policies and actions, and the consequences of these policies and actions (Glenn, 2003a).

Spies (1982) offers a succinct definition of futures research in an organisational context:

Future research is a systematic approach to helping a decision maker choose a course of action by investigating the full problem, searching out objectives and alternatives, and comparing them in the light of their consequences, using an appropriate framework-insofar as possible analytic-to bring experts judgement and intuition to bear on the problem. (Spies, 1982)

Schwartz (2005) states that 'what seems to be commonly agreed on in various definitions of futures studies (Masini, 1993; Bell, 1997) is that the purpose of futures research is to create and describe various alternative futures'.

There are many diverse techniques for theorising, observing, and interpreting the future directions and consequences of societal, economic, and technological change (Gordon et al, 2005). The field of futures studies provides a multitude of qualitative and quantitative approaches for consideration of the future. Glenn (2003a) suggests that there are some philosophical assumptions behind futures research that most futurists would accept such as:

1. You cannot know the future, but a range of possible futures can be known;
2. The likelihood of a future event or condition can be changed by policy, and policy consequences can be forecasted;
3. Gradations of foreknowledge and probabilities can be made; we can be more certain about the sunrise than about the rise of the stock market;
4. No single method should be trusted; hence, cross referencing methods improves foresight; and
5. Humans will have more influence on the future than they did in the past.

Futurists attempt to clarify goals and values, describe trends, explain conditions, formulate alternative images of the future, and invent, evaluate, and select policy alternatives (Bell, 1996). Although somewhat historical in its position, the following provides a concise definition of future studies (Futures, 1969):

The aim of futures (research) is to reduce the margin of error in estimating likely developments and to introduce a measure of stability into decision-making by reducing the uncertainty that attends the contemplation of major projects in a time of rapid change. (Futures, 1969)

Flechtheim (1980) identifies the origins of the modern day discipline of future studies to post WWII, mainly due to the perception of an increasing speed of change, making predictions of the future more difficult. While Lang (2006) traces the origin of modern future studies back to the 1950s and 60s, Schwartz (2005) states that it's not completely clear when future studies first appeared as 'humans have always thought about the future'. Although in the West future studies was first closely associated with the military, the benefit of such research was soon realised and the tools spread quickly to the private and government sectors. We now have a whole genre of research methodologies which enable us to plan for the future (Lang, 2006).

2.1.2 Rapid Change

In today's rapidly changing world, many people believe that it is becoming almost impossible to plan for the future (Lindgren & Bandhold, 2003; Rescher, 1997; Cornish, 2004). We read everywhere about rapid and constant change and, therefore, the increasing unpredictability of the future. Glenn (2003a) believes that the increasing complexity and acceleration of change decreases the lead-time for decisions and makes previous expectations less reliable. Forecasting increases lead-time between potential events and current planning.

Toffler launched his famous concept, Future Shock in the mid 1960s, arguing what happens to people who are overwhelmed by change, how they manage-or fail-to adapt themselves to the future (Toffler, 1970). A main conclusion is that the speed of change can often be more important than the direction of change (Dahle, 1996).

Lindgren & Bandhold developed the term *raplex* to describe environments that are both rapidly changing and complex. They define raplex as 'a rapidly changing, complex and unpredictable environment' (Lindgren & Bandhold 2003).

Experts in the field including Slaughter (1995 & 2002); Cornish (2004); Fahey & Randall (1998); Schwartz (1991); Robinson (2003); Wack (1985); and Willmott & Nelson (2005) offer the viewpoint that increasingly rapid change as a key reason for the increasing importance of, and interest in futures studies.

The German futurist Ossip Flechtheim (1966) introduced the term futurology literally meaning the study of the future while in US exile as early as 1943 in a concern for visions of the future different from those of American capitalism and Soviet socialism (Rescher, 1997). He proposed futurology as *logic of the future* in the same way as history searches for the logic of the past (Dahle, 1996). Futurology is the detailed critical inspection and reasoning of the state in which things will develop in the future on the basis of existing

circumstances in history. Flechtheim (1966) attempted to assess the fate of mankind in the coming centuries as objectively as possible in a semi-scientific manner but received criticism for his belief in this type of approach as the limitations of prediction and probability jar with contemporary approaches to the creation of possible and preferable futures. The importance of alternative and multiple futures rather than one single future is now the vogue. As the systematic forecasting of the future based upon present trends, futurology is seen by Woudhuysen (2006) as the pop word for forecasting and is often used by non-practitioners.

2.1.3 Exploring Alternative Futures

Henchey (1978) developed a way to categorise the futures we face and suggested that we think of the future in terms of what is possible, plausible, probable and preferable.

Type of future	Description
Possible futures	Possible futures are all the things we can possibly imagine, no matter how unlikely. Thus possible futures may include science fiction futures that transgress the currently accepted 'laws' of science.
Plausible futures	Plausible futures comprise only the possible futures that seem to make sense given what we know today. Plausible futures can be forecasts of individual trends or a set of scenarios that combine various trends to describe a range of alternative futures
Probable futures	Probable futures are the one we think is most likely to happen, based on examination of the current situation and appraisal of likely trends and future developments. It is one of the plausible futures, and is sometimes referred to as 'business as usual'. This descriptive forecasting reflects the fact that most people see the future as an extension of the present with little significant change. Ironically, history has illustrated that this image of the future is the least likely to occur. It assumes that all the conditions that shape our present situation will remain stable and unchanged.
Preferable futures	Preferable futures are the one we would like to have happen and are sometimes called a prescriptive future or normative forecast. This is where vision becomes important as it moves reality beyond the present toward the best that can be. A set of scenarios can and should include such options. Creating a shared vision of the preferred future health care system or of a healthy community can be a powerful technique for mobilising an organisation or community around a common purpose.

Fig. 2.2 Futures Categorisation (Henchey, 1978)

Voros (2003) carefully distinguishes between five classes of alternative futures (potential, possible, plausible, probable and preferable) in order to help participants of foresight workshops and processes conceptualise what sort of futures they are thinking about. Voros (2003) proposes that elements of this taxonomy go back at least to Henchey (1978), while of use also was the manner of characterisation of futures used by Hancock & Bezold (1994), as was their metaphor of the futures cone (see 2.1.4), which was a valuable aid in communication. Voros (2003) sees potential futures as all of the futures which lie ahead, including those which we can comprehend and conceptualise but also those beyond the bounds of our imagination and perception.

List (2004) explains that some futures will be shared widely; some will be shared by smaller groups of people; and every individual will have their own private future. Here List proposes the notion that there are multiple futures rather than one shared future, this view is supported by many futurists (for example, Masini, 1993; Fahey & Randall, 1998; and van der Heijden, 2004) in that there are a plethora of diverse and discrete futures rather than one commonly shared future. This marks a change from early futurists such as Flechtheim who attempted, often through scientific methods, to anticipate a collective future for humankind. During the latter part of the 20th century it became the norm to acknowledge that there will to be multiple, often conflicting, futures rather than one monolithic future that we all experience.

2.1.4 The Futures Cone

Hancock & Bezold's (1994) Futures Cone is a valuable way to represent Henchey's (1978) classification of the future as it visualises their relationships but is adapted to include all five of Voros' (2003) classifications. Within the zone of plausible futures there can be a number of scenarios, including the probable future. The preferable future is often different from the probable future and is usually - but not necessarily - within the plausible zone. The futures cone illustrates that all these futures start from where we are today, but they diverge. The closer one is to today, the harder it is to tell them apart, but clearly choices made now can have dramatic effects over time. The outer area is the zone of possibilities, which includes a number of wildcards - typically events with low probability but high impact. Although most planning efforts deal with the zone defined by the plausible, having a sense of what kinds of wildcards might arise is useful (Canadian Medical Association, 2000).

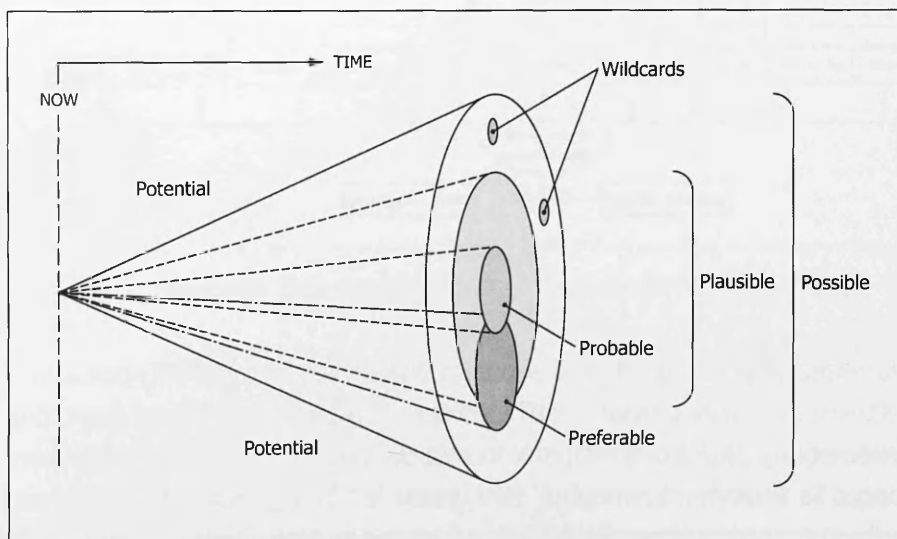


Fig. 2.3 The Futures Cone (Hancock & Bezold, 1994)

If we were to accept that the future is pre-determined (Amara, 1981) then the entire futures cone collapses into a single future time-line, all potentialities disappear, and all our futures work becomes simply an attempt to find more information about this pre-determined but unknown future (Voros, 2003). Within the futures cone, as time expands

from today so too the number of futures increases as there exists a greater range of possible outcomes (Barber, 2006). A weakness with the futures cone is that it potentially creates the illusion that we travel from now into the future in a linear manner. Obviously this is not the case so caution is needed to understand that this linear visualisation is just that – a way of visualising Henchey’s (1978) categories of the future.

2.1.5 Classification of Futures Thinking

Börjeson et al (2006) state that various typologies have been suggested in attempts to make the field of futures studies easier to understand. Armstrong (2001a, 2004) has developed a Selection Tree for Forecasting Methods:

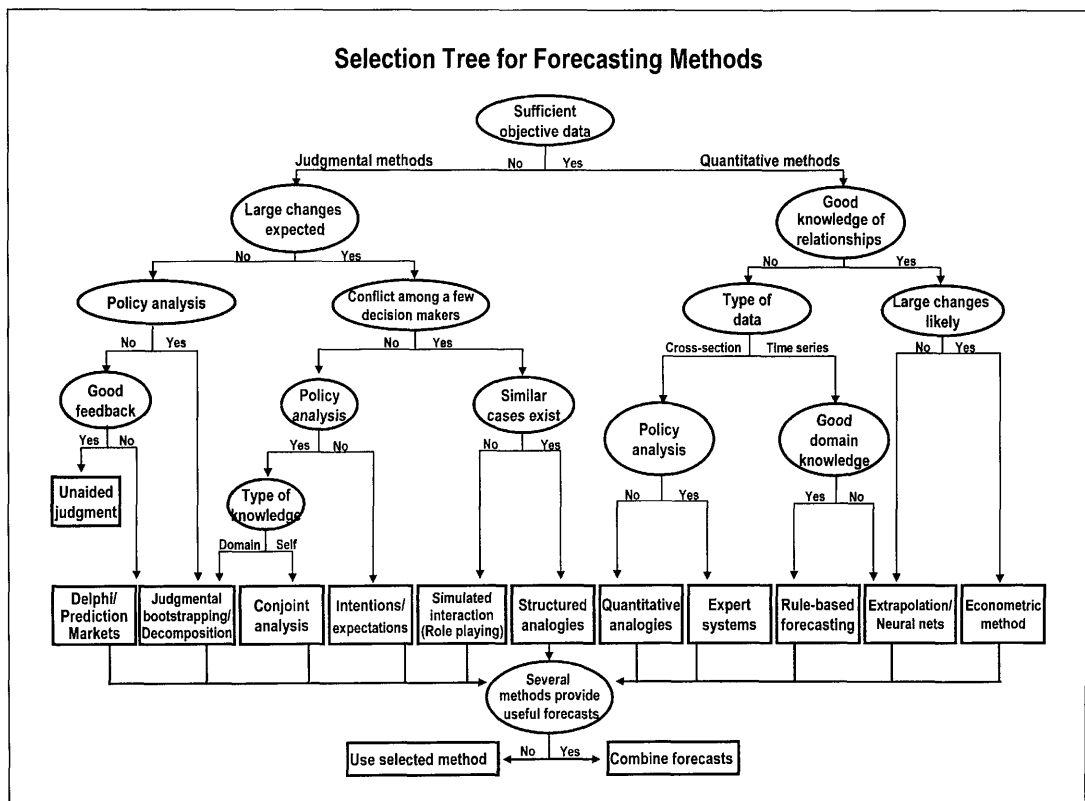


Fig. 2.4 Selection Tree for Forecasting Methods (Armstrong, 2004)

Armstrong (2001a) first divides the methods into those primarily based upon judgement and those based upon statistical sources. Then, moving down the selection tree, the methods display an increasing amount of integration between judgemental and statistical procedures. Armstrong (2001a) states that ‘judgement pervades all aspects of forecasting’. Judgemental methods are split into those that predict one’s own behaviour versus those in which experts predict how others will behave. Looking at the behaviour of oneself, another split asks whether these forecasts will be done with or without the influence of a role. The role can often have a powerful influence upon behaviour.

The use of selection trees in future thinking varies across different sectors and assists the attempt to select which method (or methods) to employ. Evidence from forecasting

literature suggests combining techniques gives more accurate forecasts (Armstrong, 2001b). Accuracy is improved by combining forecasts derived from different methods or different sources of information.

2.1.6 Attributes of Futurists

A number of commentators (for example Dator, 1996; Buchen, 2004; and James, 1996) have proposed characteristics for practitioners of futures studies, or futurists as they are commonly known. Each provides differing perspectives to the nature of what is required to be a futurist, and the nature of expertise required. Although there is much commonality in their positions, there is no commonly accepted profile for the perfect futurist.

Dator (1996) maintains that the future is not predictable and no one knows with anywhere near sufficient certainty what the future will be, but adds that we should not trust in luck, god, or fate. He identifies that the following is required to be what he calls a good futurist. To be a good futurist, you need the:

▪ widest possible knowledge of the history and present condition of as many cultures and civilisations as possible; you must know more than one culture, and thus more than one language, intimately
▪ widest possible knowledge of all aspects of all the social sciences
▪ widest possible knowledge of current and emerging developments in the natural sciences, and their emerging sub disciplines and transdisciplines, for example, evolutionary systems theory, chaos theory, and brain science
▪ widest possible familiarity with developments in engineering (especially electronics and genetics), architecture, and space sciences
▪ widest possible familiarity with philosophy, ethics, morals, and religions, and certainly the ethical discourse of as many different traditions as possible
▪ widest possible familiarity with law and planning
▪ an active awareness of aesthetics and the aesthetic element in all aspects of life. A continuing experience of aesthetic expression in some, or preferably many, modes
▪ creativity, imagination, the willingness to think new thoughts, to make unmade connections, to be ridiculed, laughed at, and to laugh at yourself
▪ ability to synthesize, combine, invent, create
▪ willingness to be politically active, to test out new ideas on yourself first and while trying actually to create a better world, or some portion of it
▪ ability to try to anticipate the consequences of actions before you act, but also the willingness to risk failure and to learn from mistakes and criticism-indeed to seek out and provoke criticism-but to keep trying to do better, and constantly to relearn what 'better' might be
▪ insatiable curiosity, unbounded compassion, incurable optimism, and an unquenchable sense of humour and delight in the absurd

Fig. 2.5 Characteristics of Futurists (adapted from Dator, 1996)

Buchen (2004) sees the alliance of imagination and technology outmatching and outperforming standard linear analysis. The future is 'not just encouraged but comes into being coincidental with the break-through of innovation' (Buchen, 2004).

James (1996) appeals for an approach they call 'thinking in the future sense' to be adopted to deal with the future. This is a remedy to the extraordinary business, economic, technological, and societal changes currently being experienced throughout the world, and adds 'we are experiencing an epic shift in the way we think about ourselves and our jobs, about the way we live, and about the future itself' (James, 1996). To think in the future tense James (1996) proposes that the following skills are required:

Skill	Description
<i>Perspective</i>	The willingness to see ahead and see with 'perspective' thus enabling us to sort out the positives and negatives of an issue or situation, and interpret change and adapt to it
<i>Pattern recognition</i>	The ability to recognise the patterns beneath our current confusion; to develop an eye for bits of information or clues that, when assembled, present us with a new and visible pattern or trend
<i>Cultural knowledge</i>	Harnessing the power of myths and symbols – the threads that link us to our past and shape our perception of the present; although idealised and exaggerated, they represent our culture's deepest beliefs and perceptions
<i>Flexibility</i>	Required to speed up our response times; the key to handling change is the ability to be flexible; see change for what it is-the natural order of things yet we do have the ability to separate positive changes from negative ones
<i>Vision</i>	Understanding the past to know the future; our memories are usually positive and selective and can keep us locked into an imaginary world where reality seldom intrudes; nostalgia can deny the inevitability of change
<i>Energy</i>	Doing more with less and become an observer of energy shifts emanating from individuals-motivation levels rise and fall when particular individuals enter the room; seek individuals that motivate you in a positive way
<i>New intelligence</i>	There is now a need for new form of intelligence, one that integrates the right brain of images and creativity with the left brain of words and calculations, in the context of the social environment; call it 'middle brain' intelligence, somewhere between reason and creative freefall
<i>Global values</i>	Become global citizens, able to move easily between countries, currencies, languages and customs; a requirement for cultural sensitivity

Fig.2.6 Skills required by Futurists (James, 1996)

The above authors have approached the characteristics required by futurists somewhat differently. Dator (1996) uses knowledge, awareness and ability as a framework, while Buchen (2004) adopts a more narrative approach. Buchen's approach may be in part due to the fact that he likens forecasting to science fiction (writing), pronouncing that two-thirds of science fiction projections happen in one form or another, and claims that 'science fiction is morphing into science fact' (James, 1996). James comes to this with a commercial perspective and focuses upon how to change our perceptions and cope with new economic realities. All approaches have merit as they provide a framework for futurist profiling although there are some discrepancies in methods used to collect this data.

A study undertaken in the United States by Jain (2006) explored the backgrounds of professional forecasters and makes two interesting observations from this study:

1. Not too many forecasters have a strong background in Statistics/Mathematics, which can be very useful in forecasting. Of course, with time this will change because statistics and mathematics play an important role in forecasting.
2. The main business background of forecasters and where the forecasting function mostly resides within a company give an indication that forecasts are used most in the Supply Chain (Production, Procurement, and Logistics). Most of the forecasters have a business background in the Supply Chain, and in most of the companies forecasting function resides within Supply Chain.

Although Jain's observations are interesting they are limited by the terminology he has employed during data collection. He uses the term *professional forecasters* to categorise the subject of his study. In doing this he has excluded a large number of professionals who undertake forecasting but do not see themselves as professional forecasters, who perhaps do not term what they do as strictly forecasting. This presents a weakness in his research methodology.

2.1.7 Summary

This section has introduced a number of historical perspectives upon how the future has been conceptualised, and identifies that the future has been, and continues to be, a focus of much human activity. The field of future studies was briefly introduced and its development and increasing importance linked to rapid societal change experienced in the latter part of the 20th century. A number of conceptual ways of considering the future, such as the futures cone, have been discussed, and the attributes of futurists presented. This section has attempted to present the future as something that is not pre-ordained. This is in line with contemporary perspectives on the future.

2.2 Key Concepts of Futures Thinking

This section presents the key concepts of futures thinking.

2.2.1 Forecasting

Forecasting seeks to anticipate the future on the basis of historical and current knowledge and trends (Schwartz, 2005). The primary aim of forecasting is to help decision makers use the best possible judgement about future events (Wilson & Keating, 2001). Assuming that the environment will not change significantly, Gray (1996) states the basic assumption of forecasting is that the past is the prologue for the future. Dortmans (2005) takes the position that forecasting as evolutionary in nature and based on the extrapolation of current and historical trends to identify potential effects that might evolve. Coates (1996) carefully identifies a differentiation between the forecast, which is generally not point-specific to time or place, and the prediction, a specific, usually quantitative statement about some future outcome. Forecasting has also been defined as 'purposeful and systematic attempts to anticipate and understand the potential direction, rate, characteristics, and effects of technological change, especially

invention, innovation, adoption, and use' (Coates, 1999). As the manifestation of forecasting, a forecast is a simple or complex look at the qualities and probabilities of a future event or trend (Cornish, 2004).

Historically, the term forecasting has also been used to mean any form of 'casting forward' to create views of the future (Rescher, 1997). Voros (2006) elaborates:

Early forms of forecasting were methods that projected forwards in time a trend noted in the past and extending to the present. This part of the method is analytical as it deals with analysing past data through trend analysis. When the trend is extrapolated, or inferred or assumed to have some continuity from the present into the future, then we have the prospective part of the method. (Voros, 2006)

Vanston (2003) maintains that forecasts need to be valid rather than accurate as the value of a forecast depends not on its specific accuracy but, rather, on the extent to which it contributes to better decision making.

The value that decision makers place on formal forecasts-and the extent to which they act on these forecasts-depends on their conviction that credible data, treated in a logical manner, support the forecasts: credible and logical in the mind of the decision-maker, not necessarily in the mind of the forecaster. Therefore, to be useful, a forecast must be both valid-based on solid facts and proven analytical techniques-and credible, meaning convincing to the people making decisions. (Vanston, 2003)

Vanston expresses this view when relating forecasting specifically to informing decision making (in relation to technological forecasting), yet he makes an interesting point – to be effective, forecasting needs to be purposeful in the decision making process, provide forewarning, and thus enable informed decisions to be made. Dator (1996), Dortmans (2005), Stevenson (2006), Masini (1993), and Lindgren & Bandhold (2003) support this view in particular that forecasting should be useful and purposeful in decision making. As an estimation of how a condition will be in the future, forecasting provides an approach that can assist in decision making (Morrison & Wilson, 1996).

Forecasting and planning are often confused particularly in business contexts. Armstrong (2001a) differentiates: *planning* concerns what the world *should* look like, while *forecasting* is about what the world *will* look like. Planners can use forecasting methods to predict the outcome of particular situations and if the forecasted outcomes are not satisfactory, revise their plans.

Dortmans (2005) identifies that forecasting encounters a problem when time horizons extend. Since forecasting is based upon incrementalsim, the longer the timeframe being considered, the less accurate forecasting becomes as the environment that is being operated in, becomes more likely to experience change. This change can impact in numerous ways and as such causes the relevant conditions to alter. Van der Heijden (2004) again conveys concern when historical data is used as the basis for forecasts especially when organisations operate in a dynamic environment. As historical data is

basis for extrapolation, this data describes the past and organisations struggle to obtain real time data. Schwartz (2005) confirms that the use of forecasting is predominantly linked to the time horizon under consideration.

The concept of genius forecasting was coined by Ralph Lenz in the late 1950s (Glenn, 2003c), however, the term is most closely associated with Herman Kahn, the original scenarist and archetypical genius forecaster. Genius forecasting is an unspecified set of processes used by geniuses to arrive at statements about the future. The processes need not be the same for any two geniuses (Glenn, 2003c). Bishop et al (2007) describe Kahn as 'blessed with high intelligence and an assertive personality, and with the research capabilities of the RAND Corporation, Kahn was the first person to encourage people to think the unthinkable, first about the consequences of nuclear war and then about every manner of future condition' (Bishop et al, 2007). As a judgmental technique, genius forecasting relies heavily on the judgment of the individual (or group) describing the future, and as such can be susceptible to bias and potential inconsistencies.

Genius forecasting has parallels with the Delphi method (see 2.2.6) in that it relies upon judgement and expertise of the individual but more so in that it does not aggregate a collective consensus as part of an iterative process. Not all statements about the future by geniuses are genius forecasts, only those pronouncements in their areas of expertise for which they have proven insight. Genius forecasting is often based upon the vision and insight of an individual. This is a potential weakness in this approach as however intelligent and expert an individual is they are not always right.

2.2.2 Foresight

The key concept of foresight is the challenge of shaping the world into one we want to live in. Foresight is the human capacity to think ahead and consider, model, create and respond to future eventualities, and possibilities and choose between them (Slaughter, 1995). Horton (1999) defines foresight as the process of developing a range of views of possible ways in which the future could develop, and understanding these sufficiently well to be able to decide what decisions can be taken today to create the best possible tomorrow. Foresight is not the ability to predict the future, but a contribution to desirable changes (Dahle, 1996). Slaughter (1995) argues succinctly that the whole point of studying the futures is not to predict but to understand alternatives as a context for numerous and dynamic choices.

Reuben (2005) supports Voros' (2003) statement that foresight is predicated on three suppositions. These are that the future is *not* predetermined, that the future is *not* predictable, and that future outcomes *can* be influenced by our choices in the present:

If the future was predetermined then it would not matter whether we explored its possibilities or not as even absolute knowledge of the future would not enable change to occur. In addition, the future is not predictable, that is, the number of variables involved, and the complexity of their interactions mean that we can only interpret coherence in

hindsight. Finally, because the future has not yet happened, we are able to make decisions and choices which will affect what the future actually becomes. (Reuben, 2005)

In foresight activities, experts offer opinions that are aggregated to form a view of possible futures, which can be used to guide policy. Based on knowledge on how things will be, not on how they are now, foresight can be more reliable and informative than the simple extrapolation of forecasts, where one overlooked internal factor may throw out the whole calculation (DFFN 2003). Foresight involves constructively bringing awareness of long-term challenges and opportunities into more immediate decision-making processes. It is a systematic, participatory future-intelligence gathering, and medium to long-term visioning-building process aimed at present-day decisions and mobilized joined actions (FOREN 2001). Voros (2003) defines foresight as:

An aspect of strategic thinking, which is meant to open up an expanded range of perceptions of the strategic options available, so that strategy-making is potentially wiser. Foresight is concerned with exploration (based on limited and patchy information) and options, not with the steps needed for the implementation of actions, which is the realm of strategic planning. The former is intuitive, disruptive and 'what if?' in nature; the latter is goal-oriented, pragmatic and 'make it happen/can do!' in nature. (Voros, 2003)

Slaughter (1995, 1996b, 1997, 1999, 2002) has widely discussed the development and application of strategic foresight, defining it as 'the ability to create and maintain a high-quality, coherent and functional forward view and to use the insights arising in organisationally useful ways; for example to detect adverse conditions, guide policy, shape strategy; to explore new markets, products and services' (Slaughter, 2002). Slaughter (1997, 2002) suggested several methodologies which could be employed in strategic foresight and provides four main types:

1. *input methods* - are ways of gathering material relevant to organisational needs
2. *analytic methods* - tend to be not so much free-standing methods in their own right so much as stages in a larger piece of work which enable analysis of potential outcomes
3. *paradigmatic methods* – require a reconceptualisation of current states and are relative newcomers to the futures methodologies arena
4. *iterative and exploratory methods* - are those which permit a substantive definition or exploration of future states, future options or future strategies

Numerous examples of comprehensive approaches to foresight exist for example Slaughter (1995 & 1997); Fahey & Randall (1998); Woodgate & Perthrick (2004); and Micic (2003). Hines & Bishop (2006) have developed a generic approach to foresight projects outlined below:

Step	Description	Product
<i>Framing</i>	Scoping the project: attitude, audience, work environment, rationale, purpose, objectives, and teams	Project Plan

Scanning	Collecting information: the system, history and context of the issue and how to scan for information regarding the future of the issue	Information
Forecasting	Describing baseline and alternative futures: drivers and uncertainties, implications, and outcomes	Baseline and alternative futures (scenarios)
Visioning	Choosing a preferred future: envisioning the best outcomes, goal-setting, performance measures	Preferred future (goals)
Planning	Organizing the resources: strategy, options, and plans	Strategic plan (strategies)
Acting	Implementing the plan: communicating the results, developing action agendas, and institutionalizing strategic thinking and intelligence systems	Action plan (initiatives)

Fig. 2.7 A generic approach to a comprehensive foresight project is outlined in the six steps (Bishop et al, 2007).

Considerable literature is available with regard to the role of foresight in futures thinking with many scholars interested in the use of foresight in organisations. The link of foresight to strategic activities is often highlighted.

2.2.3 Wildcards

Wildcard events are high-impact, low-probability events that happen quickly which, if they occur, cause major disruption and have very high impact (Petersen, 1997). The term often refers to a future event that is unlikely during the period of time being considered but would have great consequences if it did (Cornish, 2004; Barber, 2006). Wildcards are events that we plan against. Schwartz & Ogilvy (1998) contest that wildcards have the power to completely change the outcome or direction of a particular event. Wildcards are sometimes surprises, discontinuities or shocks (Voros, 2006). According to Schwartz & Ogilvy (1998) wildcards might be:

- Wholly discontinuous events like natural disasters or assassinations
- Discontinuities that might be anticipated but have significant unintended consequences.
- Catalytic developments so different in degree or scale that they have a unique effect upon society.

Scenarios that consider wildcards can encourage an organisation to stretch its collective mind and think beyond mainstream thinking. Voros (2003) states that 'wildcards are, in a sense, a boundary-spanning, boundary-crossing or boundary-smashing tool; they are useful to break through bounded thinking into new realms outside the boundary.' The use of wildcards to force an expansion of thinking into new territories of the imagination can be extremely useful. For example, playing with the edge of what people consider impossible; is a good way of nudging on the boundary of the possible. Wildcards are not events that are unimaginable but they are often, not considered in our everyday thoughts or decision making processes.

2.2.4 Visioning

A vision is a vivid picture of a desired future, often expressed in a short and pithy way. It must be well anchored in the hearts of those who are to make it come true (Lindgren & Bandhold, 2003). Bezold (1996) defines a vision as a compelling statement of the preferred future that an organisation or community wants to create adding 'vision development is the most powerful way to clarify where you would like change to go'. Visioning is used to create a preferred future by projecting values and aspirations into the future, then describing that future succinctly in a powerful phrase or sentence, or as a scenario (Canadian Medical Association, 2000). Participants in a visioning exercise are invited to imagine entirely new visions or images of the future, without necessarily worrying too much about how they would be brought about, or about how different they were from current reality (Voros, 2003).

Visions spring from the capacity to recognise the seeds of change that lie in the past and the present; moreover, visions make it possible to create a future that is different from the present although its seeds are in the present. In a sense, visions capture the changes that are already latent in the present and posit these as the future reality. (Masini, 2006)

In visioning activities, questions typically ask is how an organisation (or equally an individual) will change from its current position to achieve goals in the future (Millett, 2006). The process includes goals, strategies, investments, and plans, which may vary in strategic content regardless of its strategic label. From a commercial perspective, visioning is a process of assessing how fit the company may be to grow and successfully compete in the future.

Visioning preferred futures is a valuable method in dealing with the future that can take us beyond the limitations of prediction based on existing trends and act as an inspiration to innovation and a better future (May, 2006). Visioning is motivational and emotive and contains a high level of desire. In fact, the driving force of visioning is wishful thinking. It has to be emotional to arouse people's visceral commitment to success. Millett (2006) uses a striking metaphor to communicate the participatory nature of visioning:

In visioning, the leader conducts the process like an orchestra-he or she may even play one instrument in the arrangement, but the leader does not try to play all instruments. The symphony of the group is what is important. (Millett, 2006)

Bezold (1996) outlines five stages in building a vision:

1. Identification of problems – *What are we trying to address?*
2. Identification of past successes – *What has been successful previously?*
3. Identification of desires for the future – *What positive aspects do we want to see in the future?*
4. Identification of measurable goals – *What will confirm that we have achieved our desires?*

5. Identification of resources to achieve those goals – *What so we need to make our vision happen?*

Bezold (1996) argues that a scenario addresses the head, but a vision addresses the heart while Senge (2006) sees a vision as 'a force in people's hearts, a force of impressive power. It is palpable, and people begin to see that it exists'. Although participants in a visioning exercise are free to imagine any possible future (Dator, 1979, 2002) they often struggle to go beyond the bounded thinking of what they understand and know and may require creative techniques to assist in free visioning.

2.2.5 Backcasting

Backcasting is a term introduced by Robinson (1982) denoting a method to analyse future options. Robinson (2003) details backcasting as:

...an approach to futures studies which involved the development of normative scenarios aimed at exploring the feasibility and implications of achieving certain desired end-points, in contrast to forecasting studies aimed at providing the most likely projection of future conditions. (Robinson (2003))

Backcasting requires a vision or image of the future to be first created, and then the series of steps needed to arrive there are worked out backwards, from the future end-state to the present-day starting point (Voros, 2006). The task is then to develop a series of steps to explain how the proposed future might actually become reality. Backcasting utilises a method that forecasts an event that will occur in the future and then asks the question 'How did this event come to be...?' (Cornish, 2004). Gordon & Glenn (2003b) define backcasting as:

Backcasting starts with the description of a future state and asks how might that state have logically be achieved by following chains of causality from that future state back to the present. (Gordon & Glenn, 2003b)

The significant distinguishing characteristic of backcasting is a concern with how desirable futures can be attained (Robinson, 1994). Backcasting involves 'working backwards from a particular desired future end-point or set of goals to the present, in order to determine the physical feasibility of that future and the policy measures that would be required to reach that point' (Robinson, 2003). Robinson (1990) identified that backcasting involves six steps:

Outline of Backcasting Method
<p>Step 1: Determine objectives</p> <ul style="list-style-type: none"> (a) describe purpose of analysis (b) determine temporal, spatial and substantive scope of analysis (c) decide number and type of scenarios
<p>Step 2: Specify goals, constraints and targets</p> <ul style="list-style-type: none"> (a) set goals, constraints and targets for scenario analysis (b) set goals, constraints and targets for exogenous variables

<p>Step 3: Describe present system (a) outline physical consumption and production processes</p>
<p>Step 4: Specify exogenous variables (a) develop description of exogenous variables (b) specify external inputs to scenario analysis</p>
<p>Step 5: Undertake scenario analysis (a) choose scenario generation approach (b) analyse future consumption and production processes at the end-point and mid-points (c) develop scenario(s) (d) iterate as required to achieve internal consistency</p>
<p>Step 6: Undertake impact analysis (a) consolidate scenario results (b) analyse social, economic and environmental impacts (c) compare results of step 6(a) and 6(b) with step 2 (d) iterate analysis (steps 2, 4 and 5) as required to ensure consistency between goals and results</p>

Fig. 2.8 Outline of Backcasting Method (Robinson, 1990)

To successfully undertake backcasting, users need to work backwards in time to determine what events must occur for that outcome to occur (List, 2004). Backcasting is a reverse evolutionary form of thinking which starts with a vision and works backwards 'at the level of things-which-need-to-be-done or events-which-need-to-be-made-to-happen' (Voros, 2006). Fahey & Randall (1998) describe backcasting as a 'future backward' approach where several significant futures are selected and participants try to discover the path that leads to them. Steps indicate what would have to happen for each future state to emerge from the present. Glenn (2003a), Coates (1999) and Robinson (2003) describe backcasting as representing a form of normative forecasting. According to Robinson (1990):

The major distinguishing characteristic of backcasting analysis is a concern, not with what futures are likely to happen, but with how desirable futures can be attained. It is thus explicitly normative, involving working backwards from a particular desirable future end-point to the present in order to determine the physical feasibility of that future and what policy measures would be required to reach that point. (Robinson, 1990)

Dreborg (1996) identifies the following conditions that favour backcasting:

- when the problem to be studied is complex, affecting many sectors and levels of society;
- when there is a need for major change, i.e. when marginal changes within the prevailing order will not be sufficient;
- when dominant trends are part of the problem-these trends are often the cornerstones of forecasts;
- when the problem to a great extent is a matter of externalities, which the market cannot treat satisfactorily;
- when the time horizon is long enough to allow considerable scope for deliberate choice

Backcasting is intended to suggest the implications of different futures, chosen 'not on the basis of their likelihood but on the basis of other criteria defined externally to the analysis' (Robinson, 2003). Backcasting offers a way to get a group to vision a desirable future and then determine what must happen in order for the goal to be reached (Voros, 2006).

2.2.6 Delphi Method

Co-developed by Olaf Helmer and Norman Dalkey in 1953 (Helmer & Dalkey, 1983), the essence of the Delphi technique is that a pool of experts (oracles) deal with a certain problem that lies in the future. The modern renaissance of futures research began with the Delphi technique at RAND, the Santa Monica think-tank in the early 1960s, where Helmer and Dalkey worked (Gordon, 2003). The name, of course, was drawn from the site of the Greek oracle at Delphi where necromancers foretold the future using hallucinogenic vapours and animal entrails. They began from a philosophical base and asked initially, 'just how much could be known about the future?' (Helmer & Rescher, 1959).

The experts are drawn from people in a wide range of professional expertises, and they are encouraged to comment upon the phrasing of the questions, the reason they chose one date over another, and anything else that seems to them pertinent to the inquiry (Pohl, 1996). Schwartz (2005) states that during this process, the experts do not have any contact with each other; their opinions are submitted by questionnaires. In evaluating the questionnaires, the goal is to achieve a consensus between the varying opinions. Helmer & Dalkey (1983) describe the aim of the Delphi technique as follows:

Its intended purpose is to make the best use of a group of experts in obtaining answers to questions requiring reliance, at least in part, on the informed intuitive options of specialists in the area of inquiry. The Delphi technique was designed to accomplish this with a minimum of interference from the kind of psychological distractions that usually attend open-forum discussions among panels of experts, and to achieve as close a consensus as possible compatible with individual divergences from the central tendency of the panel's opinions. (Helmer & Dalkey, 1983)

The key to a successful Delphi study lies in the selection of participants. Since the results of a Delphi depend on the knowledge and cooperation of the panellists, persons who are likely to contribute valuable ideas are essential to the process.

2.2.7 Environmental (or Horizon) Scanning

Environmental scanning is the systematic search of current developments, usually through detailed review of selected formal and informal publications, of current developments and trend shifts that suggest that future changes may be brewing (Millennium Project, 2007). For Schwartz (2005) environmental scanning describes a process in which the environment of an organisation is systematically scanned for relevant information. Environmental scanning aims to distinguish among what is constant, what changes, and what constantly changes. Morrison & Wilson (1996) identify

that the primary goal of environmental scanning is 'to alter decision-makers to potentially significant external impingements before they have crystallised so that decision-makers have as much lead time as possible to consider and plan for the implications of this change'. Gordon & Glenn (2003a) add:

Since plans are based on forecasts and forecasts are based on assumptions about the future, scanning the horizon is always prudent to identify new developments that can challenge past assumptions or provide new perspective to future threats or opportunities. Environmental scanning systems provide early warning about important changes and detect weak signals that indicate plans should be amended. Gordon & Glenn (2003a)

Cornish (2004) points out that 'to think seriously about the future, we must first find out what is happening now that has lasting importance'. He sees environmental scanning as the effort to identify and understand those phenomena or aspects of the world that are most relevant to the people or groups who need this information for important decisions. The scope of environmental scanning is broad and likened by Morrison & Wilson (1996) to viewing a radar with a 360° sweep to pick up any signal of change in the external environment.

The techniques for collecting, reviewing, and analysing current literature were originally developed by military intelligence officers, who would scan publications for clues to what was happening in enemy countries (Cornish, 2004). This so called 'scan, clip, and review' approach was used extensively in WWII, and has been adopted by business and government organisations. Brown & Weiner (1985) cite constant scanning as a method for updating our knowledge of the world and acts as a radar system for business and government. They elaborate:

An environmental scanner looks primarily for developments or trends that are likely to have major impacts upon human life, particularly in the areas important to the scanner's organisation. Generally speaking, these developments do not consist of single isolated events, but are elements in a major trend. (Brown & Weiner, 1985)

Environmental scanning provides early warning about important changes in the environment and detects *weak signals* that indicate plans should be amended (Gordon & Glenn, 2003a). Strictly speaking, it is a monitoring of the present, not a system for imagining the future. Scanning is usually used at the start of a futures project. The classic work on scanning undertaken by Aguilar (1967) identified four modes of collecting scanning information - two types of viewing and two types of searching – namely undirected viewing, conditioned viewing, informal searching, and formal searching. Aguilar's scanning modes have been condensed by Morrison et al (1984) to passive and active scanning:

Mode	Description
<i>Passive scanning</i>	Passive scanning is what most of us do when we read magazines or newspapers (often reading the same type of publications on a regular basis). Morrison & Wilson (1996) see the consequences of passive scanning as (i) not systematically utilising the information as intelligence information, and (ii) missing ideas that might signal changes in the microenvironment.
<i>Active scanning</i>	Active scanning focussed attention on information resources that encompass the broad areas of social, technological, economic, environmental and political sectors – locally, regionally, nationally, and globally. Morrison & Wilson (1996) state that it is important to include resources that represent different perspectives in the same category when undertaking active scanning.

Fig. 2.9 Passive and Active Scanning (Morrison et al, 1984)

Wilson (1998) identifies the range of frameworks that can be useful for identifying relevant environmental forces. The SEPT formula organises forces in terms of Social, Economic, Political, and Technological trends and can be critically analysed by identifying forces (a) at micro and macro levels, and (b) in terms of local, national, and international consequences.

category	examples
<i>Demographic patterns</i>	Age, family, household, ethnic structures, and trends Regional and national migration Labour force structure and trends
<i>Social and lifestyle factors</i>	Consumer values, needs and wants Psychographic profiles Education levels Social issues and priorities Special-interest groups
<i>Economic conditions</i>	Macroeconomic trends (GNP, trade, inflation) Microeconomic trends (wages, consumer spending) Regional and national variations Economic structure
<i>Natural resources</i>	Energy prices and availability Raw materials Land use
<i>Physical environment</i>	Air/water/land pollution trends Environmental quality issues (global warming)
<i>Political and regulatory forces</i>	Geopolitical trends and blocs Political party shifts (privatisation, deregulation) Governmental expenditures, deficits Specific regulations and government policies
<i>Technological forces</i>	Basic research trends Emerging technologies Technological infrastructure
<i>International relations</i>	Levels of tension, conflict Trade and protectionism International monetary system, exchange rates
<i>Market forces</i>	Specific customer wants, needs, spending Shopping and distribution patterns
<i>Competition</i>	Changes in industry (mergers, acquisitions) Sources of new/substitute competition Sources of competitive advantage

Fig. 2.10 A Framework for Identifying Environmental Forces (Wilson, 1998. pp87)

2.2.8 Environmental Monitoring

Environmental monitoring is the continuous /ongoing observation of certain aspects of something. It is likened by Cornish (2004) to 'the way that nurses monitor the vital signs of patients'. Monitoring typically focuses on selected features of the environment in which one operates. Every potential change in the macroeconomic environment cannot receive equal attention, thus items are selected by defining topics or issues that are incorporated into 'the interesting future' (Morrison & Wilson, 1996). Renfro & Morrison (1983) see this as the period in which major policy options adopted now could probably have significant effect. Those trends and events that are important but not critical at a given point, are not monitored closely. This monitoring seeks to detect changes in the status of these trends and potential events.

Signals of change that are identified in environmental scanning should be monitored in the process of environmental monitoring (Morrison & Wilson, 1996) and as such environmental monitoring follows the process of environmental scanning. Environmental monitoring involves the in-depth monitoring of relatively few but important trends or changes (Millett, 2006). In environmental monitoring, it is advisable to use descriptors or indicators of critical trends and potential events as key words in a systematic search to obtain information about them. Environmental scanning can act as a yardstick for the potential changes in a particular context and can identify the tendency (increasing or decreasing) of a particular phenomena.

2.2.9 Trends

A trend is a general direction in which something is developing or changing; changes that occur through time; longer term shifts. Lindgren & Bandhold (2003) define trends as 'longer-term, often irreversible, changes that frequently take place over a number of years'. Schwartz (2005) provides two clear definitions of trends: (i) a 'classical' definition that perceives a trend as an ongoing fundamental societal change over a longer period of time; and (ii) a 'modern' definition that perceives a trend as a short-time phenomenon, e.g. fashion or music. Liebl (2002) views trends as a phenomenon that are always complex and which cannot be perceived simply as a fashion nor can its lifespan be measured accurately. This definition supports the classical definition of trends as provided by Schwartz as it suggests a longer time horizon than merely a flash in the pan.

Lindgren & Bandhold (2003) consider a trend to be something that represents a deeper change than a fad (changes that occur very quickly). A fad refers to a fashion that becomes popular in a culture relatively quickly, but loses popularity dramatically. The difference between trends and fads is similar to that between climate and weather. Fads burn brightly but for a short time.

Trends provide a path for us to follow from the present world into the future world because they indicate conditions that we will probably have to deal with in the years ahead (Voros, 2003). A trend by definition has already begun – its existence implies that

it already has an inclination, and Cornish (2004) identifies a trend is spotted rather than created. This can lead to the situation of self-fulfilling prophesy where the act of identifying a trend affirms its existence and thus reinforces its direction or tendency.

Although researching for trends means to look out for the new, the objects linked in a trend don't necessarily need to be new, but most likely they will be reconfigured, so that the trend itself needs to be a new phenomenon (Schwartz, 2005). Since trends tend to have more than one counter-trend, understanding the trend may be more important than predicting its future course. Schwartz (2005) adds, 'if one is able to understand the trend or to gain more knowledge of the nature of a trend, one will not only be able to react to trends but may even be able to influence the course of a trend.'

Schwartz (2005) argues that trends are important starting points for futures studies and utilised in methods such as scenario techniques, Delphi techniques, and forecasting. These methods rely heavily upon trends:

- In the scenario technique, trends are used as a basis to create alternative pictures of the future (Schoemaker, 1995);
- The Delphi method relies on trends to ask experts to express their opinions on the probable future course of trends (Robinson, 2003); and
- Forecasting techniques rely upon extrapolating trends (Armstrong, 2001b)

Gladwell (2002) popularised the notion of a tipping point in relation to a trend. He explored a way of understanding why change so often happens quickly and unexpectedly. The tipping point is when a particular trend moves over ground and becomes recognisable and thus lodged in our culture. Higham (2009) claims that 'trends start when an environmental shift disrupts consumers normative attitudes and behaviours' and he terms the resulting consumer reaction as trend initiators.

2.2.10 Trend Forecasting, Trend Projection, and Trend Extrapolation

As a trend is something that has already begun, being able to identify where it may end is important within many industries. This process is often called Trend Forecasting, Trend Projection or Trend Extrapolation (Dator, 1996; Fahey & Randall, 1998). These terms are often used interchangeably. Cornish (2004) reasons that when data is available, a trend can be plotted to show changes through time. Trends can be projected into the future often on the basis of the recent rate of change. Such a projection shows where a trend should be at some point in the future assuming there is no shift in the rate of change (Dator, 1996). Wildcards can impact upon the reliability of trend projections as they alter the rate of change.

Trend extrapolation uses past data to define a pattern of change and extends that pattern to project future developments. Trends can be projected into the future often on the basis of the recent rate of change showing where a trend should be at some point in

the future, assuming there is no shift in the rate of change (Morrison & Wilson, 1996). Futurists who look at trends are often also concerned with possible trend breaks or so-called counter trends or discontinuities which go against the trend dynamics (Voros, 2003).

Dator (1996) identifies three types of trends that each require different types of understanding:

- (i) There are trends which are a continuation of the present and the past. In order to understand these trends, we need to understand what is happening now, and what has happened before. These are the kinds of trends found in most strategic plans.
- (ii) Other trends are more or less cyclical. They thus are not part of our own personal experience, but they were part of some aspect of the more distant past. Such trends may require some mathematical technique to discover and understand. Still, because we have not personally experienced the impact of these trends, we will find it very difficult fully to know what to expect from them.
- (iii) There may be things in the future which are completely new; which have never before been humanly experienced. These trends might better be called 'emerging issues' as they are barely visible in the present, and non-existent in the past. Many futurists argue that the most important trends of the future are these utterly new emerging issues. Methods for determining emerging issues are quite different from the way we can measure and forecast most trends and cycles.

Following a classic bell curve, each trend has a predictable path which it follows from the moment the first glimmers of a new direction appear until the last time the trend has any significance. (Marketing Directions, 2000) and is sometimes referred to as a trend life cycle or trend curve.

2.2.11 Summary

This section has presented key concepts of futures thinking. Many of these concepts share a number of attributes. For example, forecasting, foresight and visioning are based in the present and project into the future issues under consideration. Backcasting utilises the opposite approach by creating a vision of the future and establishing the series of steps required for this future state to occur. Backcasting moves from the future into the present.

The type of future states that these concepts support, in terms of possible, plausible, probable, and preferable futures, vary. Forecasting is concerned with probable futures while foresight and visioning are concerned with preferable. Trends can represent possible, plausible, and probable futures while the use of a Delphi technique aims to reveal probable futures. Wildcards reveal upon possible and plausible futures while environmental monitoring is predominately concerned with possible and probable futures.

The types of futures that the above concepts support enable the exploration of a range of futures, appropriate to a variety of needs and situations. By understanding the type of future that is of interest, the selection of a particular concept is made easier.

There are similarities between a number of the future studies concepts discussed within this section. Environmental scanning is closely aligned with trends and trend forecasting. Similarly environmental monitoring shares many traits with trend projection and extrapolation. These concepts seek to understand and communicate current developments to assist in decision making relevant to an aspect of the future. As a means of monitoring, understanding, and communicating societal changes, they can be utilised as inputs to a range of future studies activities.

The following section will discuss the nature and role of scenarios within future studies.

2.3 Key Concepts of Futures Thinking: Scenarios

Scenarios are often described as the archetypical product of futures studies (Schwartz, 1991; Lindgren & Bandhold, 2003; Cornish, 2004; van der Heijden, 2004; Börjeson et al, 2006 for example). They represent a narrative approach that can be utilised in an amazing variety of situations, can be scaled to encompass an enormous number of issues or, be focussed upon a relatively small area of concern. Their communication can be brief or immensely data rich.

This section will discuss the main attributes of scenarios, summarise the key stages in their development, present an overview of their use in contemporary contexts, and detail the underpinning methodology relevant to their creation.

2.3.1 Scenarios

Herman Kahn is widely credited as the first to use the term scenario in relation to possible futures in the post war period (Glenn, 2003b). While the legend that Herman Kahn adopted the term scenario from the movie industry may or may not be true, its prevalence underscores the use of stories - or more formally narratives - as a device to convey a sense of the future (Shearer, 2004). Kahn's original definition was 'a hypothetical sequence of events constructed for the purpose of focusing attention on causal events and decision points' (Kahn, 1962). He latterly described scenarios as:

...attempts to describe in some detail a hypothetical sequence of events that could lead plausibly to the situation envisaged. Scenarios can be used to produce, perhaps in impressionistic tones, the future development of the world as a whole, a culture, a nation, or some group or class. The scenario is particularly suited to dealing with events taken together, integrating several aspects of a situation more or less simultaneously. (Kahn & Wiener, 1967)

The term scenario comes from the dramatic arts: In the theatre, a scenario refers to an outline of the plot; in movies, a scenario is a summary or set of directions for the

sequence of action (Glenn, 2003b). There are numerous definitions of scenarios, the following are prominent

- Scenarios provide alternative views of the future. They identify some significant events, main actors and their motivations, and they convey how the world functions (Shell, 2007).
- A descriptive vision of the future communicated by a narrative structure outlining how certain dynamics of change occur over time (Dator, 1996).
- A description of a sequence of events that might possible occur in the future (Cornish 2004).
- Descriptive narratives of plausible alternative projections of a specific part of the future (Fahey & Randall, 1998).
- A tool for ordering one's perceptions about alternative future environments in which one's decision might be played out right (Schwartz, 1991).
- A disciplined method for imaging possible futures in which organisational decisions may be played out (Shoemaker, 1995).
- A detailed exploration of a future possibility, a script-like characterisation of a possible future presented in considerable detail, with special emphasis on causal connections, internal consistency, and concreteness (Shoemaker, 1992).
- The most important characteristic of scenarios is that they are hypothetical. Scenarios are not meant to represent anything other than a draft, a sketch of a hypothetical future. The aim is that of singling out and underlining the 'ramification points' of the future and to underline which are the factors that determine one direction rather than another (Perry & Puglisi, 2002).
- A narrative structure outlining, to a greater or lesser degree of detail, how certain dynamics of change occur over time. It is an analysis cast in narrative form, and is thereby able to borrow heavily from the human propensity to remember well-crafted stories and plots with relative ease (Voros, 2003).

In brief, a scenario is normally developed by: (i) studying the facts of a situation, (ii) selecting something that might happen, and (iii) imagining the various ways for that development to occur and the sequence of events that it might follow (Cornish, 2004).

Scenarios allow participants to develop a new understanding of the present.

Scenarios do not recast or reshape the present; rather they provide distinctive vantage points from which to re-examine, how the marketplace or industry is unfolding, which forces are shaping its evolution, and why it might evolve one way rather than another. (Fahey, 2003b)

The search for a strong central image or metaphor to make the scenario memorable and organise the information collected is a key part of the work for some scenario practitioners (Flowers, 2003). For others, it is a central image/metaphor that is sought first, and the transition to the scenario world fleshed out afterward. It differs from

visioning by considering a set of alternatives rather than a single future, which is the more usual outcome of a visioning exercise, and by using mode evolutionary thinking to chart the different trajectories into the future worlds. Thus, this approach also has resonances with backcasting (Voros, 2003). Scenarios can reveal more about their date of creation than about their target date (List, 2004).

Kahn (1967) identifies a number of characteristics of scenarios:

1. They serve to call attention, sometimes dramatically and persuasively, to the larger range of possibilities that must be considered in the analysis of the future. They are one of the most effective tools in lessening the 'carry-over' thinking that is likely even when it is clear to all that 2000 cannot be the same as 1965 (or even 1985). Scenarios are one way to force oneself and others to plunge into the unfamiliar and rapidly changing world of the present and the future.
2. They dramatise and illustrate the possibilities they focus on in a very useful way. (They may do little or nothing for the possibilities they do not focus on.)
3. They force the analyst to deal with details and dynamics that he might easily avoid treating if he restricted himself to abstract considerations. Typically no particular set of the many possible sets of details and dynamics seems especially worth treating, so none are treated, even though a detailed investigation of even a few arbitrarily chosen cases can be most helpful.
4. They help to illuminate the interaction of psychological, social, economic, cultural, political, and military factors, including the influence of individual political personalities upon what otherwise might be abstract considerations, and they do so in a form that permits the comprehension of many such interacting elements at once.
5. They can illustrate forcefully, sometimes in oversimplified fashion, certain principles, issues, or questions that might be ignored or lost if one insisted on taking examples only from the complex and controversial real world.
6. They may also be used to consider alternative possible outcomes of certain real past and present events.
7. They can be used as artificial 'case histories' and 'historical anecdotes' to make up to some degree for the paucity of actual examples.

2.3.2 Herman Kahn: The RAND Corporation and The Hudson Institute

Commentators (for example Bruce-Briggs, 2000; Coates, 1996a; Singer, 1996; and Wagar, 1996) attribute the modern day introduction of scenarios as a method for considering the future to Herman Kahn. Kahn developed scenarios to see past the cultural blind spot that thermonuclear war must never happen. What if it did happen? asked Kahn. Wagar (1996) claims that 'no one can doubt that Herman Kahn was present at the creation of futures studies as a multidisciplinary field of inquiry'. During his time at the Rand Corporation in the 1940s and 1950s, much of Kahn's work was concerned with military strategy for the US government (Bruce-Briggs, 2000). After founding the Hudson

Institute think-tank in the 1960s, Kahn further developed the scope and use of scenarios while undertaking seminal research, ultimately defining the phrase 'thinking the unthinkable' (Cornish, 2004). Kahn saw scenarios as fiction rather than rigorous forecasts, not with the intention of making accurate predictions but to come up with a mythic story that brought the point home (Dearlove, 2002). Kahn contributed to the methodological and theoretical foundations of futures studies: developed the scenario method, the application of systems analysis and of mathematical and scientific tools to forecasting, and the organisational bases of interdisciplinary and future-oriented research. The work of Kahn contributed to the development of futures thinking and its acceptance and utilisation within governmental and business contexts.

2.3.3 Scenario Typologies

Börjeson et al (2006) confirm that various typologies have been suggested in attempts to make the field of futures studies easier understand and provide a detailed summary of these typologies:

- Masini (1993) identifies three approaches: extrapolation, utopian and vision: utopian includes both positive and negative futures and is characterised by the difference to the probable; visionary has to do with how the utopias could come about.
- Dreborg (2004) presents three modes of thinking: predictive, eventualities and visionary. To each of these, Dreborg assigns methodologies to study the future. Forecasting, external scenarios and backcasting are examples of methodologies that are quite 'pure' forms of the predictive, eventualities and visionary modes of thinking, respectively.
- Mannermaa (1991) presents descriptive, scenario paradigm and evolutionary typologies: the descriptive focuses on objective trends; the scenario paradigm is characterised by not predicting but constructing several different futures and paths to them; the evolutionary adopts a world-view of society developing in phases with good predictability.
- van Notten et al (2003) divide scenarios into overarching themes - the project goal (why?), process design (how?) and scenario content (what?). The project goal can be explorative or decision support, the process design intuitive or formal and the scenario content complex or simple.

Börjeson et al (2006) developed a classification based on the principal questions they believe a user may want to pose about the future: *What will happen?*, *What can happen?* and *How can a specific target be reached?*

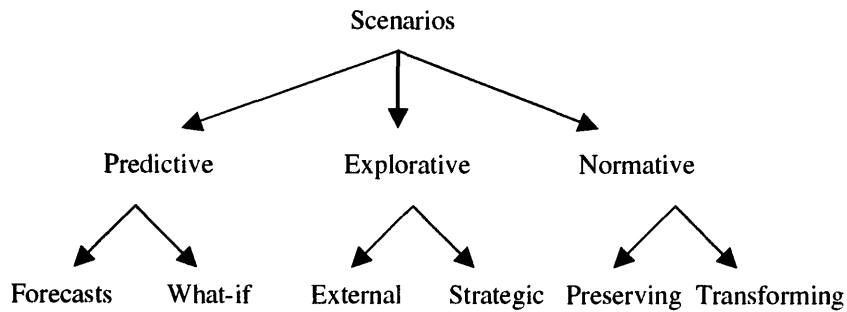


Fig. 2.11 Scenario Typology with three categories and six types (Börjeson et al, 2006)

Scenario category	Description
Predictive scenarios	<i>Predictive scenarios</i> consist of two different types, distinguished by the conditions they place on <i>What will happen?</i> <i>Forecasts</i> respond to the question: <i>What will happen, on the condition that the likely development unfolds?</i> <i>What-if</i> scenarios respond to the question: <i>What will happen, on the condition of some specified events?</i>
Explorative scenarios	<i>Explorative scenarios</i> are defined by the fact that they respond to the question <i>What can happen?</i> Börjeson et al (2006) distinguish between the two types, external scenarios and strategic scenarios. <i>External scenarios</i> respond to the user's question: <i>What can happen to the development of external factors?</i> <i>Strategic scenarios</i> respond to the question: <i>What can happen if we act in a certain way?</i>
Normative scenarios	<i>Normative scenarios</i> consist of two different types, and respond to the question <i>How can a specific target be reached?</i> They are distinguished by how the system structure is treated. <i>Preserving scenarios</i> respond to the question: <i>How can the target be reached, by adjustments to current situation?</i> <i>Transforming scenarios</i> respond to the question: <i>How can the target be reached, when the prevailing structure blocks necessary changes?</i>

Fig. 2.12 Scenario Categories (adapted from Börjeson et al, 2006)

2.3.4 Scenario Planning

Scenario planning is a method for learning about the future by understanding the nature and impact of the most uncertain and important driving forces affecting our future. Scenario planning involves two elements: (i) constructing or developing scenarios, and (ii) integrating the content of scenarios into decision making (Fahey & Randall, 1998). Scenario planning reinforces the need for scenarios and decision making to be intimately intertwined. This process helps policy-makers to anticipate hidden weaknesses and inflexibilities in organisations strategy.

Scenario planning is technique that helps organisations 'think the unthinkable' by creating alternative stories, or scenarios, about how the future might pan out (Dearlove, 2002). Scenario planning is one of the most widely used methods to undertake forecasting. Its approach provides several coherent futures, selected from an infinite number of possibilities.

In recent years scenario planning has moved on from being a formal, planning-like process, to become more of a thinking tool. It's a methodology for contingent thinking, for thinking about different possibilities and asking the question 'what if...?' (Dearlove, 2002).

There are many variations of the scenario planning process. Mercer (1995) identifies six steps that can be mapped effectively onto the majority of approaches:

1. Decide the drivers for change
2. Bring drivers together into a viable framework
3. Produce internal mini-scenarios
4. Reduce to two or three full-scenarios
5. Write the scenarios
6. Identify issues arising

Steps 1 and 2 are predominately concerned with information gathering and analysis or framing the question; 3, 4 and 5 relate to the actual production and refinement of the scenarios; and 6 the examination of the most critical outcomes and their potential impact.

Scenario planning entails developing knowledge about the future (and the present) and integrating such knowledge into decision making (Fahey, 2003b). It aims to make scenario work central to developing strategy alternatives, choosing among them, and executing the preferred course of action. When undertaken correctly, scenario planning is integral to making and carrying out decisions, not a separate process.

2.3.5 Elements of Scenarios

Scenarios consist of a number of key elements that exist in one form or another in the various methodologies adopted by individual organisations (Fahey & Randall 1998; Fahey, 2003a). They usually utilise information gained from environmental scanning – the activity that collects information from a wide range of sources that informs future propositions – and incorporate this into a conceivable, meaningful and understandable form. The relationship of key elements is thus:

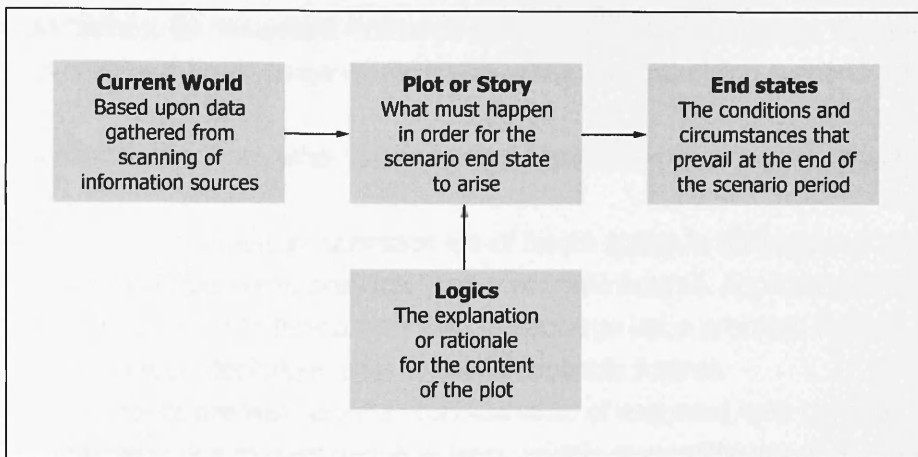


Fig. 2.13 Key Scenario Elements

- *Driving forces* are those that propel the story described in a particular plot. On a general level these forces can be segmented into two categories: *environmental* (such as economic, social, technological, etc.) and the *actions of the institutions* (undertakings by relevant bodies).
- *Logics* constitute the rationales that underlie a scenario's plot described as the 'why' underlying the 'what' and 'how' of a scenario plot. Logics provide the explanation of why specific forces or players behave as they do. Without an understanding of its logics, decision makers cannot assess the plausibility of a scenario (Fahey & Randall 1998).
- *Plots* contain a story that connects the present to the end state; they illustrate what would have to happen for a specific future or world to come to be.
- *End states* describe what will happen in a particular future or world at some specific point in time thus making scenarios specific and unambiguous. One way to generate end states is to ask: What would happen if...? Depending upon the purpose of the scenario, end states can be rich or sparse in detail. It is important that we do not consider the descriptions of end states to be forecasts, they are not.

2.3.6 Summary

This section has discussed scenarios as a key approach utilised in future studies. Scenarios are often cited as the archetypical product of future studies and receive much attention in future studies literature (Amara, 1981; Schwartz, 1991; Coates, 1996; Didsbury, 1996; Lindgren & Bandhold, 2003; Cornish, 2004; van der Heijden, 2004; Börjeson et al, 2006).

Scenarios are used in many situations to address a seemingly never ending list of challenges. They are frequently utilised in governmental planning as much as in commercial contexts. As a way of thinking the unthinkable, they are particularly effective in breaking people out of everyday thinking and as such are an effective form of divergent thinking. The creation of hypothetical stories about a possible future enables participants to extend their thinking further into the future than many other future studies

approaches. Its movement from only a formal planning process to being a thinking tool has enabled a broad range of sectors to utilise the underlying scenario process.

Scenarios differ from other future studies approaches in a number of ways.

- Scenarios enable an unending set of future states to be imagined supporting possible, plausible, probable, and preferable futures. Approaches such as trend extrapolation or forecasting tend to converge upon probable futures, while the use of a Delphi technique aims to reveal probable futures.
- Scenarios are well suited to consideration of extended time horizons and in many respects due to their narrative form, enable storytelling about the future, while forecasting for example becomes less reliable as time horizons extend.
- Scenarios are concerned with the future rather than the present as they are explicitly about a time yet to come. Environmental monitoring for example is concerned with observation of an area of interest in the present with the aims of identifying change.
- Scenarios are not necessarily concerned with identifying how the future will be, but are concerned with developing our thinking regarding what the future may mean if it were to occur in the form they describe. Foresight for example is a normative approach that seeks to converge upon a preferred future through action in the present. Scenarios open up the possibilities of the future while foresight aims to close down avenues of the future.

Scenarios do share some common principles with other future studies approaches. Visioning for example considers future states with little concern for how they were arrived at. This is in line with the types of futures that scenarios can support. Scenarios also aim to inform decision making in the present as does environmental monitoring and backcasting but may achieve this aim in a different way. Obviously as a future studies approach scenarios share conceptual aspects with other future studies approaches yet the manner in which they are applied, the contexts in which they are employed, and the range of skills required to effectively undertake scenario development differ widely.

The first three sections of the literature chapter have been concerned with concepts of future studies. These future thinking approaches have presented a range of ways of conceptualising the future, outlined key concepts employed to understand and communicate a range of future states, and explored the similarities and differences between the presented concepts.

The following sections of this chapter will now explore design as a discipline, activity, and academic field.

2.4 Design context: Theory and practice

Design as a discipline, activity, and academic field is multifaceted. Design is given quite specific and different meanings by particular groups of people (Jones, 1970; Cross, 2000; Borja de Mozota, 2003; Lawson, 1997 & 2004; Oakley, 1984 & 1990). Design can be viewed as a discrete activity, as a total process, or in terms of its tangible outcome. Design has many levels of meaning; it affects everyday life in a diversity of cultures (Borja de Mozota, 2003; Julier, 2000; Best, 2006; Lorenz, 1986). Heskett (2002) contends that under the rubric of design the range of practice is vast. It encompasses craft, industrial art, commercial art, engineering design, product design, graphic design, fashion design, and interactive design to name but a few (Topalian, 1980; Pilditch, 1976; Heskett, 2002).

2.4.1 What is Design?

The meaning of the word design is much contested (Topalian, 1980; Walsh et al, 1992; Julier, 2000; Sparke, 2004; Berger, 2009a) and is used in a multitude of contexts and has accumulated numerous different meanings (Potter, 1969; Laurel, 2003; Heskett, 2002; Cross, 2000; Lawson, 1997, 2004; Dorst, 2007). Walker (1989) states that design can refer to 'a process (the act of practicing designing); or to the result of that process (a design, sketch, plan, or model); or to the products manufactured with the aid of design (design goods); or to the look or overall pattern of a product ('I like the design of that dress)'. Commentators, including Lawson (1997), Dormer (1991) and Bruce & Bessant (2002), stress that design is both a noun and verb, stating that it can refer either to the end product or the process. Heskett (2002) elaborates upon this position and uses the following to illustrate the point:

Consider the shifts of meaning when using the word 'design' in English, illustrated by a seemingly nonsensical sentence:

'Design is to design a design to produce a design'

Yet every use of the word is grammatically correct. The first is a noun indicating a general concept of a field as a whole, as in: 'Design is important to the national economy'. The second is a verb, indicating action or process: 'She is commissioned to design a new kitchen blender'. The third is also a noun, meaning a concept or proposal: 'The design was presented to the client for approval'. The final use is again a noun indicating a finished product of some kind, the concept made actual: 'The new VW Beetle revives a classic design'. (Heskett, 2002)

Eckert and Clarkson (2005) discuss the scope of design thus:

Design is described in two distinct ways - by reference to the process of design or to the product that has been designed. The former, also known as designing, is often described as an iterative process in which the need, or problem, is understood as the solution is generated and evaluated. The alternative view sees design as all the activities that lead from the first idea for a product to its pre-production prototype. Design then includes a

wide range of tasks with very different underlying cognitive processes. (Eckert & Clarkson, 2005)

Lawson (1997) proposes that design manifests itself in many forms and can 'deal with both precise and vague ideas, call for systematic and chaotic thinking, need both imaginative thought and mechanical calculation'. The following are just a small selection of definitions of design from literature.

Design is...

...to initiate change in man-made things. (Jones, 1970)

... the human capacity to shape and make our environment without precedent in nature, to serve our needs, and give meaning to our lives. (Heskett, 2002)

...clearly a process that suggests how the world might be rather than how it is now. (Lawson, 2004)

...a process that translates ideas, opportunities or triggers into something through the consistent deployment of creativity. (Bruce & Bessant, 2002)

...the preparation of a prescription for some artefact or system in the light of all relevant functional, constructional, economic, marketing, ergonomic and aesthetic requirements. (Archer, 1974)

As much discourse has identified (Jones, 1970; Cross, 2000; Oakley, 1984 & 1990; Margolin, 1989; Buchanan & Margolin, 1995; Walsh et al, 1992; Dormer, 1991; and Sparke, 2004 for example), there is no commonly held definition of design as indented purpose, context, and environment all influence its meaning.

Cooper & Press (1995) identify six perspectives of design that provide an insight into its breath and scope:

Design as...	Description
<i>Art</i>	Design has acquired a similar status to that of art in contemporary culture, manifested in stylistic diversity. While design shares some methods and cultural roles with art, it differs in terms of its concern with problem solving and meeting user needs.
<i>Problem solving</i>	Design as a problem-solving activity involves balancing a range of factors: technology, production, and use. Design involves a synthesis of aesthetics and function.
<i>Creativity</i>	The act of designing involves a combination of logical and intuitive thought which is encouraged in design education. As a solution-led creative activity, design does not always fit into the traditional culture of management.
<i>A family of professions</i>	Design encompasses a broad range of activities - a family of professions - that share common traditions. On one side it borders with art, on the other it borders with engineering. The four areas of design mostly used in business are product, environmental, information, and corporate identity design.
<i>An industry</i>	The dominance of design as a consultancy- service has tended to prevent its full integration as a core activity of many companies. There is far more use of designers as external consultants rather than in-house designers.

A planning process

Design can be usefully viewed as a strategic planning process that applies the innovative potential of the enterprise with the changing requirements of the market. The extent to which design is viewed as an individual creative activity or as a corporate planning process depends upon context.

Fig.2.14 Six Perspectives on Design (Cooper & Press, 1995)

This thesis is predominately concerned with design as a process and as such will receive the majority of attention. In this context, design will be considered the decision making process that deals with the manifestation of future objects with consideration to economy and technical function and in answer to various consumer demands. Commentators identify design as a prospective activity which has a key concern with the future. Lawson develops his position that designers are concerned with how the world might be stating:

The designer has a prescriptive rather than descriptive job. Unlike scientists who describe how the world is, designers suggest how it might be. Designers are therefore futurologists to some extent. (Lawson, 2005)

In the above description, Lawson positions designers (and by inference the design process) firmly in a prospective role that is future focussed and intent upon creating the future for consumers. Seymour (2008) echoes this position claiming that designers should be 'leading the way by visualizing and articulating achievable futures' (Seymour, 2008). He elaborates upon the role of designers as futurists:

Designers by the nature of their work are futurists. The least time it takes to produce a product and get it on the shelf is a couple of years. Sometimes it can be 10-15 years. So you're already dealing with the future when you sit at your desk in the morning. (Seymour, 2010)

The value of consideration of future contexts by designers was persuasively stated over a third of a century ago by Cross, Elliot and Roy who claimed that:

Visions of the future are particularly important for designers, because designers have to imagine both the future conditions that will exist when their designs actually come into use and how those conditions will be changed by the creation of their new design. (Cross, Elliot & Roy, 1975)

We can assert from the above points of view that designers are concerned with the future as an intrinsic part of the design process. Their activities are future focussed and concerned with creating the world they envisage for consumers.

An understanding of the design profession and how this manifests itself in contemporary design practice follows to gain insight into the multiplicity of the industry.

2.4.2 Profession and Sectors

Julier (2000) affirms that the design profession is concerned with innovation, change and invention yet constantly reinvents itself to meet the challenges of contemporary society. Alongside an exponential expansion of the design profession since the 1980s, there has

been an ever-increasing diversification of its practices that means it's difficult to ascertain singular models of design consultancy.

The Design Council (2008) identify the following design sectors and although not conclusive, it offers insight into the fragmentation of contemporary design practice:

Sector	Characteristics
<i>Automotive design</i>	Automotive design is a complicated discipline primarily concerned with the appearance of a vehicle. It is governed by various factors including security, safety and engineering - all of which have their own set of specialists. This means that as well as designing to very high standards, automotive designers must have excellent team working skills.
<i>Building design</i>	Building design is both a product and a process. As a product, building design ranges from the public to the private realms - from hotels and office headquarters through to hospitals and housing. As a process, or service, it is the means by which designers manipulate a building, or space, to meet a client's needs.
<i>Experience design</i>	Experience design concentrates on moments of engagement between people and brands, and the memories these moments create. For customers, all these moments of corporate experience combine to shape perceptions, motivate their brand commitment and influence the likelihood of repurchase in the future. Experience design is not driven by a single design discipline but instead requires a truly cross-discipline perspective.
<i>Information design</i>	Information design, also known as communication design, is a rapidly growing discipline that draws on typography, graphic design, applied linguistics, applied psychology, applied ergonomics, computing, and other fields. It emerged as a response to people's need to understand and use such things as forms, legal documents, signs, computer interfaces, technical information and operating/assembly instructions.
<i>Interaction design</i>	Interaction design is the key skill used in creating an interface through which information technology can be manipulated. As products and services are increasingly being created using information technology, interaction design is likely to become the key design skill of this century. It focuses on users attempting to complete a task or achieve an objective, using a tool (device) in a particular context. Interaction is the influence of persons or things on each other, encompassing action and communication.
<i>Packaging design</i>	Packaging design can be viewed in four different ways: (i) a means of protecting the contents of a package, (ii) a contributor to the cost of the end product, (iii) a sales canvas on which to promote the product's attributes and benefits, and (iv) a part of the product experience itself. Most products are meaningless (or at least undifferentiated) without their packaging.
<i>Product design</i>	Product design is an integral part of the wider process of developing new products of every type. In most cases, this will be for volume production. The product design process should ideally dovetail with every part of the wider development process, but typically it is much more involved at the beginning of the process than at the end. The process of product design can have a wide remit and typically involves a series of different phases.
<i>Retail design</i>	Retail design involves more than just creating the physical space in which the goods are sold; it requires an understanding of what makes the retail experience unique. For brands in particular, the retail forum is perhaps one of the most testing encounters they will have with their consumers. The term 'retail design' encompasses all aspects of the design of a store.

<i>Service design</i>	Service design can be both tangible and intangible. It can involve artefacts and other things including communication, environment and behaviours. Whichever form it takes it must be consistent, easy to use and be strategically applied. The service sector is growing, both in terms of numbers employed and in its importance to the British economy.
<i>Temporary exhibition design</i>	Temporary exhibition design refers to the creation of a non-permanent environment with the purpose of displaying, conveying or promoting a product, brand, service, idea, view, message or information to an audience. Held in a 'live' environment, temporary exhibitions are unusual in that they provide the designer with the scope to appeal to all the visitor's senses.
<i>Workplace design</i>	Workplace design has many different, interrelated elements, including spatial layout, lighting, furniture specification, material finishes and technology services. Designing offices to release innovation potential within the organisation links the application of a number of design processes directly to the realisation of organisational goals.

Fig. 2.15 Design sectors (adapted from the Design Council, 2008)

Numerous commentators (Laurel, 2003; Best, 2006; Cooper & Press, 2003; Jerrard & Hands, 2008; Hands, 2009; Waisburg, 2009; Julier, 2000, Heskett, 2002) have focussed upon the blurring of design boundaries and its impact upon the activities of designers and the shape of the design industry. Traditional boundaries of two and three dimensional design are no longer relevant as interdisciplinarity, specialism, and niche approaches underpin much of contemporary design practice. The above overview of design sectors is presented to provide a snapshot of the breadth of activities under the rubric of design.

Schneider (2003) claims that product design epitomizes the diversity of possible connections between users and society (what is desirable), economy (what is viable), and technology (what is feasible) and provide the most potential of all design disciplines for valuable engagement with future thinking.

2.4.3 Design Process

It is intended to provide an overview of the design process at a conceptual level in this literature review, summarising historical and contemporary thinking. It is not the authors' intention to provide a detailed synthesis of the vast work undertaken in design discourse, but provide a 'meta-level overview' of key concepts and thinking.

Design development occurs in distinct phases (Goel, 1995). In a study of the design process, the Design Council (2007) identified that literature on the design process is vast, yet mostly inconclusive (this is in line with numerous commentators such as Oakley, 1990; Lawson, 2004; Topalian, 1980; Pilditch, 1976; Bruce & Bessant, 2002; Archer, 1965; Cross, 2000). The Design Council's study noted that 'debate is typically based around the activity of defining, developing and monitoring a process for design and is largely concerned with its management and influence on business performance' (Design Council, 2007). Best (2006) defines the design process as:

...the specific series of events, actions or methods by which a procedure or set of procedures are followed, in order to achieve an intended purpose, goal or outcome. (Best, 2006)

The design process continues to receive much attention from academics and practitioners without a broadly held consensus of a model process being reached. This view is echoed by Dorst (2007), Cross (2000), Archer (1974), Blaich and Blaich (1993), Lawson and Dorst (2009), and Ulrich and Eppinger (2000). A comprehensive review of current practices and methodologies on the topic of design process was been undertaken by Eckert and Clarkson (2005) yet, as with the meaning of design, no single design process model is prevalent. Bahrami and Dagli (1993) confirm this point of view:

Despite the extensive research undertaken since the 1950s, there is no single model which is agreed to provide a satisfactory description of the design process. (Bahrami & Dagli, 1993)

While Lawson (1997) states 'the extent to which the various design fields share a common process is a matter of considerable debate', the lack of a broadly held consensus (Archer, 1965 & 1974; Jones, 1970; Walsh et al, 1992) of the nature and make-up of the design process can in part be attributed to the nuances required in different design contexts. For example, a fashion designer will work in a very different way to an engineering designer and vice versa (Bruce, 2002). This said, there is a widely held view (Eckert & Clarkson, 2005; Archer, 1965; Best, 2006; Pugh, 1990; Lawson, 1997 & 2004; Wynn & Clarkson, 2005; Cross, 2000) that at an abstract level, there is a central core of generic stages that constitute a commonality between design processes.

Cross (1975, 1984, 1989, 1996, 2000, 2007) has written widely upon the design process and claims that the 'ultimate purpose of the design process remains the communication of proposals for a new artefact' and that the focus of all design activities is the description of this proposed artefact (Cross, 2008). This view is supported by Ulrich & Eppinger (2000) and Jones (1970) amongst others.

Along with Christopher Alexander and Bruce Archer, John Chris Jones was one of the pioneers of the design methods movement. Jones first published *Design Methods* in 1970 which included several models of design and the design process. In the early days of formalising the design process (predominately during the 1960s), it often took on a linear format and featured a series of arrows and boxes. These models themselves tell us a great deal about the design process. The Design Council (2007) claim that in attempting to systemise the design and the design process, 'design had stepped into the genre of science'.

Much of the work undertaken to understand and communicate what the design process is has involved the use of visualisations at a conceptual or abstract level (Wynn & Clarkson, 2005; Cross, 2008; Eckert & Clarkson, 2005; Walsh et al, 1992). The detail and scope of these visualisations varies greatly. Dubberly's (2004) *Compendium of Models* of the

design and development process that provides a useful navigation through historical and contemporary design process thinking from academic and practitioner perspectives. The following summary of the design process identifies 4 key typologies:

- *Process*: The notion that the design process involves inputs and outputs and in between something happens, i.e. the process
- *Analysis, Synthesis, Evaluation*: Originally introduced by Jones (1970) as a basic framework for design and the design process
- *Linear Models*: Involving simple to complex models of the design process
- *Cyclic Models*: Casts the design process as an iterative activity

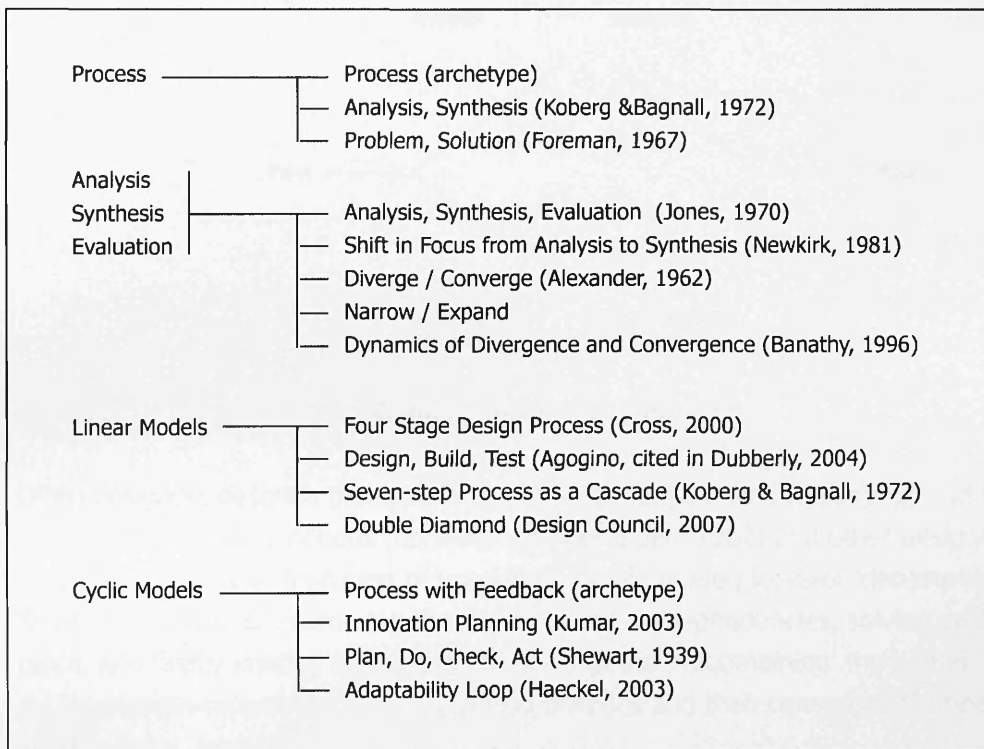


Fig. 2.16 Design process typologies (adapted from Dubberly, 2004)

There are many variations upon the above design process typologies. The following is a summary of the four identified typologies of the design process and are presented to provide a generic understanding of their constituent parts, differences and similarities.

2.4.3.1 Process (Archetype)

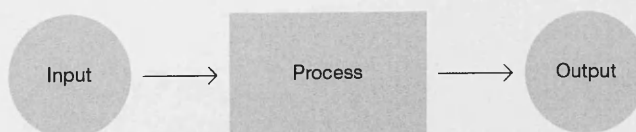


Fig. 2.17 Design Process: Process

A process must have input and output. In between, something may happen - the process - a transformation. One risk in using this framework is that it neatens a messy world. It may promote an illusion of linearity and mechanism - of cause and effect. Foreman (1967) casts design as problem solving. This stance is typical of the first generation of the design methods movement (during the 1960s). Koberg & Bagnall (1972) observe that 'first, we break the situation or whole problem into parts for examination (Analysis) and second, we reassemble the situation based on our understanding of improvements discovered in our study (Synthesis)'.

2.4.3.2 Analysis, Synthesis, Evaluation

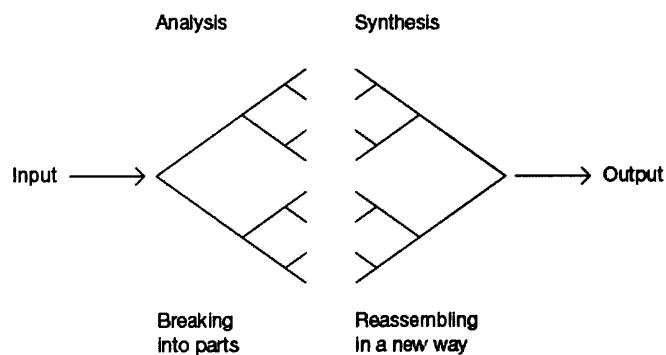


Fig. 2.18 Design Process: Analysis, Synthesis, Evaluation

Often designers describe themselves as creating many options (diverging) and then narrowing down their options (converging). Alexander (1962) and other designers have described analysis as a process of breaking a problem into pieces-of 'decomposing' it. Synthesis follows as re-ordering the pieces based on dependencies, solving each sub-piece, and finally knitting all the pieces back together-'recombining' the pieces. This decomposition-recombination process also diverges and then converges (Dubberly, 2004).

2.4.3.3 Linear Models

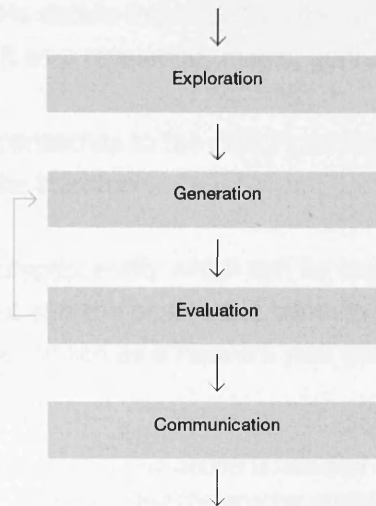


Fig. 2.19 Design Process: Linear Models

Cross (2000) developed this 'simple descriptive model of the design process, based on the essential activities that the designer performs. The end-point of the process is the communication of a design, ready for manufacture. Prior to this, the design proposal is subject to evaluation against the goals, constraints and criteria of the design brief. The proposal itself arises from the generation of a concept by the designer, usually after some initial exploration of the ill-defined problem space'.

2.4.3.4 Cyclic Models

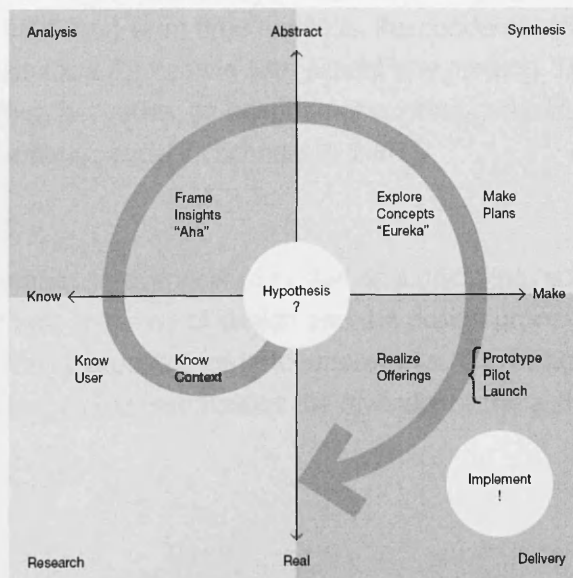


Fig. 2.20 Design Process: Cyclic Models

Kumar (2004) describes 'modes of planning (rather than steps) emphasising the iterative and interconnected nature of the design process. He has also mapped tools and methods onto each of the modes. He details innovation as the jump from insight to concept-from aha to eureka-describing it as a revelation, magic, genius, intuition, a hunch'.

The above four generic approaches to the design process outline the variety and breadth of viewpoints evident in the literature.

The design process is a complex entity which can be looked at from two viewpoints: the actions that are carried out and the observable behaviour (Wynn & Clarkson, 2005). Both of these viewpoints can be viewed as a network with casual connections between the elements. They elaborate:

One action leads to the next and no action is initiated unless motivated by another action of external driver. ... Understanding the process means understanding these casual connections. (Wynn & Clarkson, 2005)

The world is evolving so quickly that there may never be an ideal methodology or process (Design Council, 2007). What matters therefore is that a flexible infrastructure is in place with the foresight and intelligence to respond quickly and appropriately to creative change. 'More than anything how the design process just continues to expand as people search for answers to how the best outcomes of design can be achieved' (Design Council, 2007). The case for the development of new design methods is made as part of the Design for Future Needs research project.

In a scoping study undertaken as part of the Design for Future Needs¹ project, Schneider (2003) identified that there are not specific design methods used for future focussed design projects that have long-term time horizons. Respondents to a survey indicated that they use the same tools for dealing with almost any project. 'There are no specific methods for forecasting, but rather an adaption of existing methods, with a higher emphasis on their qualitative aspect' (Schneider, 2003).

2.4.4 Summary

This section has presented an overview of design as a discipline, activity, and academic field. Consensus upon the meaning of design and the design process is not evident although there are broadly accepted generic frameworks. The design industry, outlines as an interconnected set of sectors exemplifies the diversity of the activities under the rubric of design.

¹ Design for Future Needs was a project run for the EC by a group of European design organisations and researched how design techniques for envisioning the future can benefit EC decision-makers' foresight planning and policy work. Its aim is to help them respond to emerging issues and trends from environmental pressures to technological change.

Design has been presented as a prospective activity with designers put forward as futurologists – concerned with the future as part of the design process. This position underpins the research proposition that:

- *Designers consider the future as an intrinsic aspect of the design process.*

2.5 Trends and socio-cultural dynamics in design

Trends and socio-cultural dynamics are important to design as 'consumers have lives and tomorrow's consumers want their way and if their way changes, as real lives change on a daily basis, they want the service, brand or company they are dealing with to change with them' (Raymond, 2003). This section details the role of trends and socio-cultural dynamics in design.

2.5.1 Trends research in design

In its inaugural editorial in 1969, *Futures* (The Journal of Future Studies) stated that:

It is nowadays much harder to forecast the future than at any time in history. Yet forecasting is essential if we are to seize the opportunities and reduce the insecurities that result from rapid change. Thus the subject of futures has arisen because of the need for systematic methods of dealing with the enormous number of variables that must be taken into account when forecasting. (Futures, 1969)

Trend research is the study about changes in culture and society. According to Øren (2001), the term trend has in its original sense been used for turn or change. In a society characterised by frequent changes, trends are the most visible indicator of what is moving and which values are prevailing. Trend research looks at the past and the present, to say something about the future (Margolin, 2007). The studies of trends are not really the creation of new alternatives, rather something that is already happening (Cornish, 2004; Rodriguez Ramirez et al, 2005; Jensen, 2005). Socio-cultural trends research is widely used as a 'motor in the design and innovation process' (Power & Tangsantikul, 2005).

Although intuition remains vital to the design process, research can often lead to surprising, counter intuitive results. Done well, trend research can help inform design briefs that get to the heart of problems and generate insights into customers and users future needs (Woudhuysen, 2006).

Schwartz (2005) perceives a trend as an ongoing fundamental societal change over a longer period of time. Trend analysis is a structural mapping of expected changes in the behaviours of societies, markets, and the consumers who drive them (Marseille & Roos, 2005). Driven by social, political, and technological developments, shifts in public opinion take rapid turns. Marseille & Roos (2005) state that it is crucial to keep track of 'those first ripples in the consumer ocean-not only when introducing new products, but also for day-to-day tracking of existing brands'. Trend analysis gives companies the opportunity

to innovate with less stress as organisations that encourage innovative thinking and trend watching are less surprised by rapid changes in consumer preference (Keinonen, 2006).

In order for companies to innovate, it is important that they have knowledge about the future. Jensen (2005) claims that organisations should use trend studies actively, and in that way develop innovative and timely products-the biggest mistake designers can make is to make out of date products. It is important to have an overview of the market in which an organisation is working in to ensure that changes or shifts in behaviour are spotted and acted upon.

Higham (2009) claims that 'trends start when an environmental shift disrupts consumer's normative attitudes and behaviours' and terms the resulting consumer reaction as trend initiators. He advocates segmenting them via PEST categories. Higham (2009) notes three stages requires when harnessing the power of trends for commercial ends: (i) identification – the process of observing change utilising both primary and secondary research, (ii) interpretation – which involves analysis and judging of trends in order to predict how it will develop, and (iii) implementation – deals with impact analysis and exploring what effects that the trend might have upon an individual sector or business.

Trends and market research are often used to inform product planning and development (Power & Tangsantikul, 2005). Market research typically tells us stories about the here and now as, understandably, people find it difficult to imagine their future lives and possibilities opened up by new products, services and environments (Woudhuysen, 2006). Socio-cultural research looks to uncover and report longer term and deeper socio-dynamic forces – or trends. Trends both reflect and embody our attitudes, values, fears, sensitivities and aspirations. Trends influence our sense of self, relationships, and place in the world (Power & Tangsantikul, 2005). Other key trend characteristics are:

- *Longevity* - significant trends usually last upwards of five or even ten years
- *Robustness* - trends are resilient to short-term fluctuations in the socio-economic and cultural climate (though catastrophic events such as terrorism, war and disease can displace them)
- *Complexity* - it is common for individuals to reflect contradictory trends depending on the roles they are playing

Viewed together, socio-cultural trends capture the spirit of the times or the *zeitgeist* (Jordan (2002) cited in Power & Tangsantikul (2005)).

Trend research has been used for competitive advantage in a wide range of sectors and is increasingly used in the product development and planning process providing a number of benefits.

Firstly, it [trend research] enables design teams to develop compelling visions of the future based on credible evidence gathered in the present. Secondly, it supports the creation of

rich pictures of potential users; their lifestyles, needs, motivations, desires and dreams. Thirdly, it enables designers to locate their work within dynamic socio-cultural settings. (Power & Tangsantikul, 2005)

Futures and trends research must have strong observational and visual components to it to be useful for design (Woudhuysen, 2006). This does not imply that only visual information is useful for design practice. Images need to be combined with statistics, charts, diagrams, quotations and incisive recommendations about what to do – and how and when to do it. Woudhuysen (2006) provided a cautionary note upon potential pitfalls when undertaking futures and trends research as personal bias can influence the integrity of such activities:

Anyone performing futures and trends research must adopt a systematic, numerate and critical approach to other practitioners' futures and trends research. To do research successfully is constantly to acknowledge and question one's assumptions, to test them, and to be prepared to revise them in light of events. It is also to accept that in general forecasts have tended to tell us more about the contemporary obsessions, fears and prejudices of the forecaster than they have about the realities of what is going to happen (Woudhuysen, 2006).

Trend researchers tend to focus upon social and cultural phenomena and trace how these change over time, locating, synthesising and interpreting information. It is vital to balance up the elements of continuity and discontinuity that surrounds trends – understanding if the trend is if it new or importantly a more or less new form of a previously underestimated but longstanding development. Trend researchers typically access information from a wide range of sources, methods and disciplines: focus groups, interviews and co-creation exercises, demographics, market research, specialist discussions, economic indicators, anthropological research, expressions of popular culture (for example movies, newspapers, magazines, television and fashion) and technological dynamics (Power & Tangsantikul, 2005).

2.5.2 Socio-cultural dynamics - People as drivers of innovation

Design has a history of utilising tools that help to understand the user and identify unmet needs (Kumar, 2004; Don & Petrick, 2003). These needs must be then communicated to the stakeholders in the development process and using this information, designers are able to transform abstract theories into tangible entities (Laurel, 2003; Ireland & Johnson, 1995).

Consumer behaviour intelligence, in terms of what influences the consumers, is important information within product development – economic, cultural and occupational factors, peer group pressure, lifestyle and psychological factors are all relevant (Cross, 2008; Borja de Mozota, 2003; Best, 2006). These need to be collected and communicated to in sensory terms to the designer (Woudhuysen, 1990; Cooper & Press 1995; Kelley & Littman, 2004 & 2006).

2.5.2.1 Consumers views are unreliable

Consumers are not good at telling researchers what they are likely to do in the future (Kelley & Littman, 2004 & 2006; Laurel, 2003; Johansen, 2007, Willmott & Nelson, 2005). Conventional market research frequently reveals only what the consumer already likes, wants or needs. It does not lend itself readily to providing intelligence regarding the future (Bruce & Cooper, 1997; Cooper & Press 1995; Coughlan & Prokopoff 2004; Raymond, 2003; Gladwell, 2000). It is essential that designers are provided with information that allows them to generate future perspectives (Keinonen, 2006). Woudhuysen considers that the cognitive and emotional issues regarding consumer lifestyle and behaviour, and their likely evolution, are of prime importance to designers (Woudhuysen, 1990). The combination of marketing data and understanding of consumer lifestyles provides insights that are essential to the design process (Borja de Mozota, 2003). The user requirements process begins by gathering and absorbing existing market research and augmenting those findings with targeted design research (Don & Petrick, 2003, Raymond, 2003).

Rust (2006) states that organisations need to know what ideas will be useful in the future, and where to invest their development effort. Designers are able to produce new ideas but cannot work in isolation and their thinking must be informed by the needs of stakeholders (Kumar, 2004; Feltham, 2004; Koen et al, 2002). Traditionally many organisations have been good understanding what has happened before, and what stakeholders think they might need in the future (Coughlan & Prokopoff, 2004). This often assumes that the future will be like the past. Organisations are interested in gaining new insights about people's needs, things that they may not be able to articulate and which are not based upon what is available today. Exactly how organisations go about this is less clear within the literature.

Tomorrow's technology driven products and services are hard to market research as although asking potential users if they consider a certain approach to be a good idea is potentially useful, their answers are unlikely to be too revealing (Margolin, 2007). People have very little experience of what they may encounter in the next few years and their answers are usually based upon what they understand today. Woudhuysen (2006) affirms that this is a continued problem in futures research.

Hollins (1999) sees formal market research as vital yet it is 'hit and miss' and 'a pretty inexact science'. Topalian (1980) affirms the need for research stating 'managers and designers do go seriously astray when they begin to believe that they can be effective arbiters of consumer needs without first researching such needs sensibly. ... It is necessary to investigate and understand markets'.

The view that consumers are not wholly reliable when articulating future wants and desires is echoed by Rust (2006), Ireland and Johnson, (1995), Marzano (2005), Kumar

(2004), Coughlan and Prokopoff (2004), Keinonen (2006), Bruce and Cooper (1997), and Borja de Mozota (2003) amongst others.

2.5.2.2 Approaches to people as catalysts for innovation

Marzano (2005a) outlines an approach he claims can enable people to act as a catalyst for breakthroughs in innovation. This enables visions of the future to be developed in line with future wants, dreams and desires of consumers. Seeking to create value in the touch points in our everyday lives, Marzano (2005a) states that 'we need to keep open minds; be ready to look at things in new ways; to be more interested in asking the right questions than in giving quick answers; to make naive inquiries; and take others naive inquiries seriously; and to create mental pictures about the near future without self-censorship'. At Philips, Marzano (2005a) applies this approach to three things to develop visions of the future: their market, themselves, and their interactions with consumers:

Focus	Description
<i>The Market</i>	A high value is placed in understanding their market and in particular people (consumers) who they see as central to their activities. This highlights a dilemma – asking people what they want rarely works as they often have no idea what they want until they experience it. To address this, Philips focus upon broader issues that just the products they manufacture and they look at the wider context in which people use them. This allows Philips to 'discover opportunities to apply their competences in ways that provide consumers with completely new benefits' (Marzano, 2005).
<i>The Organisation</i>	Organisations should be considered in terms of a portfolio of competences rather than as business units, and then consider how these competences can be combined to provide new solutions. Where new competences are required, partnering with cognate organisations should be considered.
<i>Interactions with Consumers</i>	The customer interface should be a key consideration when developing visions of the future, specifically how organisations meet and deal with consumers. This is both in terms of physical (shops, premises, events) and virtually (web, email, telephone).

Fig. 2.21 People as a Source of Breakthrough Innovation (Marzano, 2005a)

The combination of insights from the above enables Philips 'to arrive at a general vision of the future. On that basis, Philips can then work out for the next few years, what types of benefits we should aim to provide, what new competences we need to do it, and how we should interact with our end users' Marzano (2005a). Philips termed their approach *High Design Strategic Futures*.

2.5.2.3 Trends in a hurry

Power and Tangsantikul (2005) detail an accelerated method for carrying out social-cultural design research termed 'Trends in a Hurry' (TIAH). TIAH consists of a small set of integrated research tools that support the gathering, analysis and evaluation of data from a broad range of sources including demographics, socio-economic, popular culture and market research that provides a framework to consider and map cultural dynamics.

The challenge faced by design teams when trend information is required is characterised by Power and Tangsantikul (2005) as lack of time, lack of contextualised information, information overload, and lack of money. The TIAH four phase methodology attempts to address these challenges is detailed below:

Phase	Focus	Description	Duration
1	Identification & Summarisation of Exemplars	Involves reviewing the work of leading international trends forecasters with the intention of identifying appropriate exemplars that could inform latter stages of the TIAH approach. A graphical trend framework is used to summarise key trends and their indicators and allows cross comparison of identified trends.	3 days
2	Data Capture	Involving collation and analysis of data including demographics, market behaviour, socio-economic dynamics and so on from a variety of existing sources. Index cards are used to summarise information with pointers to their original source and other contextual information. Simultaneously, lifestyle representations in the popular media are reviewed including magazines, movies, music, TV and the press and visual data gathered for use later in the TIAH process.	4 days
3	Exploration	Data gathered in phase 2 is explored in relation to exemplars utilising an open-ended and discursive manner, masking notes upon a graphical trend framework. Ranking of trends in order of relevance to a particular project or application is undertaken. Deeper exploration of particular trends can be undertaken to (i) identify multiple drivers or indicators that provide credibility to the project, and (ii) to reflect upon the trend more deeply; to ask questions, and challenge and explore its meaning in specific contexts. Visual mood boards are developed to encourage different ways of critical thinking and trigger new associations	4 days
4	Synthesis, Development and Application of the Trend Framework	Enables the proposal of key social-cultural trends that are current or emerging. These trends are subjected to further scrutiny using tools developed within the trends research community – for example, the 'Futures Wheel', an augmented brainstorm technique, and various scenario building techniques. An iterative process is undertaken where trends are clarified, renamed, merged, and even discarded until a final set of trends are developed.	4 days

Fig. 2.22 Trends in a Hurry Methodology (Power and Tangsantikul, 2005)

The TIAH process results in (i) an abbreviated graphical framework that quickly communicated key aspects of each trend, and (ii) a detailed report that evaluates key global developments and drivers, key issues and implications for the client and associated project. TIAH is an example of a pragmatic, manageable and modifiable means of generating socio-cultural trends information for use in design projects where time, money and usable information are in short supply.

2.5.3 Summary

This section has explored the role of the consumer in future oriented design activity. It discussed how trend based research can support the identification of socio-cultural shifts and in turn use this information in the development of visions of the future. It also

discussed the role of the consumer acting as a potential catalyst for innovation activities, but went on to identify the inherent unreliability of consumers when asked about what future products and services they desire. It concluded with two design led approaches for exploration of the future in consort with potential consumers.

What is evident from the above listed approaches is there is a lack of consensus with regard to exactly how design can, and does, engage with the future as part of the design activity. Although a number of approaches are present within the literature, there is a lack of cohesion regarding which approaches to adopt, and how to implement them. As such this position supports the research proposition:

- *There are no commonly accepted approaches in futures thinking in the design discipline.*

2.6 Design Concepts: Use of concepts to explore and communicate the future

This section discusses the use of a range of future oriented design approaches to explore and communicate the future. As identified in sec.2.5.3, there is a lack of consensus regarding the exact consideration of the future within design and thus the associated use of futures thinking approaches.

2.6.1 Mental images of the future

According to Damasio (2003) the creation of a mental image about the future can have similar effects to those invoked by a mental image about the past. It allows us to flash-forward (the opposite of flashback) to expected events, projected or imagined to occur in future and create a memory of that future. Déjà vu is the experience of feeling sure that one has witnessed or experienced a new situation previously is related to Damasio's (2003) position upon mental images of the future.

Thinking about the future events and their consequences is described as prospective thinking (Atance & O'Neill, 2001). This is defined as how we remember to engage in an intended action at a specific point in the future, for example remembering to give someone a message. Effective prospective thinking allows the pre-experience of a future event. People project themselves into the future, pre-experiencing an event or situation before it has occurred. This process is called Episodic Future Thinking (EFT) (Atance & O'Neill 2001 & 2005). EFT is used to envisage future events, and plan for them accordingly. The use of episodic EFT is based on experience of similar events and the knowledge we may have gained from that experience. Humans have the ability to re-experience situations and project them into the future, applying them to events that we perceive to have similarity (Atance & O'Neill 2001 & 2005; Damasio, 2003).

Ingvar (1985) described the way the human brain deals with complex environment to ensure our future preparedness as individuals. A part of the human brain is constantly

occupied with making up action plans for the future, making and storing alternative time paths into the future. This memory of the future helps us to establish a correspondence between incoming information and one of the stored alternative time paths. It also allows us to filter out irrelevant information that has no meaning for any of the 'options for the future which we worked out'. Marzano (2005) has augmented this concept and used it to describe how design concepts can be used to plant memories of the future in people's minds.

Thinking about potential future developments opens your mind so that you are ready to see the signs relevant to those developments if and when they occur. The brain uses plans and ideas just like real memories and experiences to filter information and guide decisions. These memories of the future potentially lead to new aspirations and desires. Marzano (2005)

The use of mental images of the future can be used in the design process (in future scenarios for example) to create conceptual propositions that articulate their thinking with regard to future design contexts. These mental images normally take the form of design concepts.

2.6.2 Concepts as provocative and promotional tools

Design has the capability of suggesting creative solutions that by their novelty, imply possible successes for industry. Rodríguez Ramírez (2007b) suggests that companies can use conceptual designs as promotional tools that help them develop an image of innovation, and as stepping stones for future developments. He states that 'in order to achieve high levels of innovation, highly provocative concepts are used to go beyond thinking more broadly and are used as stimulating interventions in client organisations'.

Design concepts also expand the range of possibilities that companies are prepared to consider by challenging what they currently do. They can entice companies to study new visions by offering believable future scenarios. Producing provocative concepts is a necessary step in assessing the scenarios that organisations may have to face in the future (Rodríguez Ramírez, 2007a). These concepts are often not intended to go into production but are used to develop and communicate an organisation's thinking to both internal and external stakeholders.

Global electronics manufacturer Philips, continually develop design concepts that research into the future yet are often not intended to enter the market. In 1995 the Vision of the Future project developed a range of electronic design concepts proposed for use in 2005 (Marzano, 1995; Somerville, 2004; Rodríguez Ramírez, 2007a). This project drew upon a number of futures thinking approaches such as scenario planning and Delphi oracles to support design activities. Although a small number of the products from the study were put into production, the main goal of the project was to show the company the range of possibilities they had. The project helped Philips establish a goal and path to work on for the following 10 years (Marzano, 1996). Rodríguez Ramírez (2007a) claims that such an approach provides design concepts that are highly valuable as promotional tools and

assist organisations to assess potential future directions (internal), and create an innovative image of the organisation in the public's perspective (external).



Fig. 2.23 'Pipette' - is a six metre long outdoor shower concept, an example of a provocative future led design concept

2.6.3 Conceptual thinking informs future activities —not intended for market launch

Design utilises future orientated projects as a mechanism for developing their thinking in a particular and importantly being able to articulate this thinking to third parties. Keinonen (2006) contends that 'design organisations undertake in-house future orientated design projects to generate background material for forthcoming external projects'. In adopting this conceptual position, organisations often extend their normal timeframe (often of 2-5 years) to break away from ordinary design routines and to motivate employees to do something different (Sääskilähti & Takala, 2006).

A common and characteristic feature of such future orientated design undertakings is that they result in descriptions of products that are not intended for production. They are often not taken beyond the prototype stage or intended to be offered to the public (Keinonen, 2006). These undertakings can be used within an organisation to achieve other kinds of business goals, supporting employee training, corporate communications, brand building, technology development and marketing.

Future orientated projects are undertaken not only to result in final outputs that make tangible the future, but also enable design teams to develop their understanding of the process. Hyvönen notes how important it is for a design agency to be continuously visualising the future, because:

...the information produced by this process reduces the design risk in forthcoming projects. The most important aspect of the process were the opportunities for learning and improving employees' motivation. (Hyvönen cited in Keinonen, 2006)

The outputs from future orientated projects, particularly in product design are often showcased publically at trade fairs, in the media, and are used to outline and communicate an organisation's aspirational brand strategy. These type of approaches provide evidence of the increasing use of futures thinking approaches in design but as has been identified, the exact manner in which these approaches are being employed is not clear.

2.6.4 Product concepting

Product concepting involves experimenting with alternative future product concepts through explorative and creative design. It does not aim to create product proposals for immediate implementation, but contributes to other decision making and learning purposes, and thus belongs to a set of activities often called *product concept design* (Keinonen, 2006). Product concepting combines several product design perspectives and requires integrated product development (Sääskilahti & Takala, 2006). Keinonen divides product concepting into the categories that are in part overlapping, but help to explain the different business roles of concept design:

Category	Description
Product Development Concepts	Refer to the fundamental outlining of a product carried out during the first phases of product creation or at least before the design specification is frozen. It supports the definition of the product specification and although ideally no commitment should yet have been made to implement any particular concept, one or more will be chosen for further development. Projects typically last weeks or months but usually less than a year.
Emerging Concepts	Created in association with technical research or the modification of products for radically different markets and are realistic and achievable. The opportunities of a new technology or market and growing user needs are unravelled, made understandable and used to support the organisations learning and decision-making processes with regard to future product generations. Projects can last months or even years.
Vision Concepts	Include factors that may not be impossible but which have not yet been proven to be feasible, but are sometimes developed to support an organisations strategic decision-making by outlining the future beyond the range of product development and research activities. There is no expectation that this kind of vision concept will be implemented, and therefore technical and commercial requirements are less restrictive. Future research, scenario development and technological anticipation can all lie behind vision concepting.

Fig. 2.24 Product Concepting categories (Keinonen, 2006)

Emerging and Vision Concepts are usually undertaken in concept design and research projects while Product Development Concepts are produced as part of product development projects. In some cases, 'a concepting project can start as a research activity and continue as a product development project' (Keinonen, 2006). Emerging and

Vision Concepts embody many of the characteristics of future orientated design. The learning process and realisation of products are so tightly intertwined, these that they cannot be easily separated.

The various approaches to product concepting - experimenting with alternative future product concepts through explorative and creative design – demonstrate the value that design places upon developing tools and techniques that assist in its exploration of the future.

2.6.5 Vision Concepting

Vision concepting aims to sketch out future products and product portfolios far beyond the normal development perspective, up to 15 to 20 years ahead (Sääskilahti & Takala, 2006). They claim that it enables the taboos of today's business to be challenged and modified in order to identify possible future paths as it gives a view beyond the blinding, close-range blur resulting from today's business environment.

Sääskilahti & Takala (2006) detail an approach for vision concepting in two main phases (i) Future Description, and (ii) Conceptualisation, which are divided into thirteen steps. The development of vision-based concept creation methods makes the assumption that design concepts can contribute to creating a vision for an organisation. Concepts can be used to make abstract futures into something tangible that can be communicated and responded to. This process involves an approach that links scenario generation, technology road mapping and concept design to provide future orientated concepts. Design can develop what technology allows into concrete and specific proposals and can link the often implicit demand with emerging possibilities (Keinonen, 2006).

Vision concepting extends the target time horizon that design often considers in their day-to-day activities. The use of visioning to support design activities demonstrates the adoption (whether knowingly or otherwise) of futures thinking approaches in design.

2.6.6 Scenario in design

The term scenarios are widely deployed in design but the exact meaning differs between each context (Higham, 2009; Raymond, 2002). The use of scenarios - essentially a narrative which contributes to design activity in one form or another – often assist organisations in the development and communication of a coherent view upon the design tack under consideration (Lawson & Dorst, 2009, Brown, 2009, Richardson, 2010). An overall vision can be created that draws together stakeholders in the design and development activity and focuses their attention. Scenarios may take the form of a written description of an element of interest but also is regularly supported by visuals that assist in the communication of a point of view (Jensen, 2005; Hollins, 2000). It should be noted that the term scenario has many different meanings in design contexts.

Scenario planning involves three fundamental elements: a vision, a rationale, and some proposals, which together constitute the scenario architecture (Manzini & Jegou, 2003):

Element	Description
<i>Vision</i>	This is the most specific element of a scenario. It answers the basic question: 'What would the world be like if...?', and it does so by telling a story or sketching a picture of what things would be like if a certain sequence of events were to take place.
<i>Rationale</i>	This is the element that justifies the scenario's existence and confers its meaning. It answers the question: 'Why is this scenario meaningful?', and it does so by explaining rationally what the scenario is meant to achieve, what its premises are, what underlying conditions apply and how various alternative propositions will be assessed (that is, using which criteria and instruments).
<i>Practicability</i>	This is the element which adds depth and consistency to the vision. It answers the questions, 'What are the various aspects of the overall vision? What does it consist of? How can we make it happen?' Different kinds of scenario give rise to different kinds of proposal which have in common the capacity to bring the scenario to life.

Fig. 2.25 Scenario Elements (Manzini & Jegou, 2003)

Manzini & Jegou (2003) have developed approaches that assist in the classification of scenarios within design activities by considering the phase of the design process it is to be used in. The kind of scenario varies according to its underlying rationale, and the way it is built. They have identified the following:

Type	Description
<i>Policy-orienting Scenario (POS)</i>	This is the vision of a context as it might appear in the presence of certain (economic, social and cultural) dynamics, and/or should certain (economic, social and cultural) policies be implemented. It supports decision-making in the face of complex and/or participatory institutional or industrial options. In general, several sets of POS present themselves, corresponding to the various policies that could be enacted.
<i>Design-orienting Scenario (DOS)</i>	This is a (motivated and multi-faceted) vision of a context as it might appear in the presence of certain (economic, social and cultural) dynamics and if carefully defined design choices were enacted. It is a support tool used in design activities where different actors take part in the strategic orientation of choices. In general, various sets of DOS present themselves, corresponding to different design options.
<i>Solution-assessing Scenario (SAS)</i>	This is a vision of a design proposal and its context which tends to highlight their reciprocal interaction. It is a support tool used in the assessment phase of a well-defined design hypothesis. In general, a single SAS is put forward which corresponds to specific design proposals and their clearly defined contexts.

Fig. 2.26 Scenario Types (Manzini & Jegou, 2003)

Scenarios are often used in design as an approach that creates compelling visions of the future that can act as triggers for the development process. By drawing upon the rich heritage of scenarios in futures thinking, design can develop effective mechanisms for incorporating scenarios into future focussed design undertakings.

2.6.7 Stories and future essays as communication mediums

Baek (2006) identifies narratives - the engaging art of storytelling - as an important source of creative ideas, and assistive in revealing new design pathways. As a catalyst for innovation, Baek cites stories as key to effective communication and as motivational and inspirational triggers for designers when considering the future. Compared to facts, stories often convey meaning more effectively and make more sense out of chaotic experience. The ability of stories to make us more open minded and less resistant to experimentation and change.

The role of the design brief is identified as central to setting the tone of a design project. Baek (2006) claims that if design briefs were stories of imagined successes told through the eyes of future customers, and through the eyes of the company as well, they would be far more inspiring and effective than a list of clients wants and intended results. This approach can be powerful to designers by allowing them to break away from preconceptions – both clients and their own.

Stories, narratives and dramas help us to articulate and focus - in design this approach is characterised in a scenario. It allows organisations to humanise mission statements and clarify and explain wants and desires in a way that engages. Importantly it allows them to explore and communicate their visions of the future (Lacey, 2002).

While storyboards were initially used as a way of defining a sequence of events in a linear form they have more recently been employed to relate a possible scenario of use where aspects of use are explored as part of the story (Mavrommati, 2001). In this way storyboards can assist in the definition of basic design decisions and interface issues. Storyboards are well used in design development as a tool for explaining not just what a proposal is, but how its use is envisaged. The storyboard can simply be a textual scenario of use where a description is given in a narrative style of an imaginary situation with actions, problems and context (Mavrommati, 2001). This helps to set the scene for a envisaged product concept. A storyboard can evolve from textual descriptions to take a more visual form where a sequence of key actions are illustrated.

Kappel & Thomsen (2007) draw parallels between design and journalism in regard to the use of a text and image combination to articulate proposed design scenarios and advocate the use of the future-essay as a design tool. Kappel & Thomsen (2007) define the future-essay as 'short image descriptions in which reports about the user's experience and relations to future product contribute to notions about design and quality of the future product' and place the future-essay in the design and development process. It is seen as a complementary tool to more traditional design and development prospective and is used to augment future led design activities. Narrative approaches as embodied in scenarios have much to offer future focussed design activities.

The use of stories (or future essays) in design has much in common with the use of scenarios from the field of futures thinking. By utilising the term story rather than scenario, design attempts to appropriate this approach for itself. Designers may not be trained in scenario creation but feel more comfortable with storytelling as this does not imply a need to undertake formal training (as formally engaging with futures thinking may require).

2.6.8 The MAYA concept and way of testing market reaction

Design practice has traditionally anticipated the future based upon evaluating technological and market trends on the basis of designers personal knowledge and long-term experience (Keinonen, 2006; Krippendorff, 2006; Margolin, 2007).

In 1951 the father of industrial design, Raymond Loewy coined the phrase Most Advanced Yet Acceptable (MAYA) when describing his concept of producing the most advanced product that research can develop and technology can produce but importantly is accepted by consumers (Loewy, 1951). Many examples exist of technology advanced products that were not accepted by consumers. Loewy claimed that for each individual product (or service) a critical point at which the consumer's desire for novelty reaches a shock-zone where the urge to purchase reaches a plateau, sometimes evolving into a resistance to buying.

It is a sort of tug of war between attraction to the new and fear of unfamiliar. The adult public's taste is not necessarily ready to accept the logical solutions to their requirements if this solution implies too vast a departure from what they have been conditioned into accepting as the norm. In other words they will only go so far. (Loewy, 1951)

Loewy claims that the smart designer is the one who has a lucid understanding of where the shock-zone lies in each particular problem – the point that he states a design has reached the MAYA stage (Loewy, 1951). As the acceptance of commercial constraints on progressive and radical design, MAYA is the critical point at which progressive design should stop before it reaches too far beyond prevailing tastes (Votolato, 1998). In the 1970s Loewy further discussed MAYA:

Not only the designer but the manufacturer frequently has problems introducing a product that leapfrogs either a need or aesthetic development. It is, therefore, risky for a manufacturer to be too far ahead of either competitors or the consumers' threshold of acceptance (Loewy, cited in Votolato, 1998).

Loewy tried to entice consumers with something new – but not so new as to startle his clients' shoppers. He used market research to help determine what consumers thought of as comfortable or conventional, and, given their conventions provide solutions that conform to his MAYA concept (Clarke, 2007).

Loewy does identify a problem the MAYA approach, namely that 'there are no yardsticks, no way to chart a curve of public reaction to advanced design' (Loewy, 1951). Although public opinion can inform this process, there are no hard and fast rules to understanding

of consumer perceptions. Launching overly advanced solutions onto the market before consumers are ready to accept them can result in costly failure.

2.6.9 Summary

This section has discussed the use of a range of future oriented design approaches to explore and communicate visions of the future. It is evident that design is comfortable undertaking conceptual or blue sky projects assuming that the necessary resources are in place. There is evidence to support a number of research propositions. These are that:

- *Designers use futures thinking approaches within the design process,*
- *Designers appropriate futures thinking methods and techniques from other areas and augment them to support design activity, and*
- *Futures thinking approaches (such as visioning and scenarios for example) are increasingly being employed in design.*

2.7 Manifestations of design and future thinking: Outputs and communications

Design has a tradition of using experiments, in the form of concept models, prototypes, and experiential events to explore new ideas and direction (Kelley & Littman, 2006; Brown, 2005 & 2009). This approach allows organisations to explore potential directions without committing to them (Keinonen, 2006). It also allows feedback to be elicited from stakeholders both internal and external to an organisation (Koen et al, 2002). The following are examples of the manifestation of experiments in design and futures thinking.

Manifestation	Description
<i>Concept cars</i>	A concept car is prototype made to showcase a concept, new styling, technology and more. They are often shown at motor shows to gauge customer reaction to new and radical designs which may or may not have a chance of being produced. General Motors designer Harley Earl is generally credited with inventing the concept car during the early 1950s. Experimentation proves itself perhaps most valuable, even indispensable, in the earliest stages of innovation when experiments can generate the organisational understanding and motivation that propel new ideas and directions. Concept cars can inspire both organisations and their customers to head toward a future that they can influence. Concept cars stand out as great examples of experiments used to inspire the market and prepare it for new ideas in styling (Brown, 2005).
<i>Expo's and World Fairs</i>	Short for Exposition, Expo's (also known as World Fairs) is the term given to large public exhibitions held since the mid 19th century. The first Expo was held in Hyde Park, London in 1851 under the title 'Great Exhibition of the Works of Industry of All Nations' was the first exhibition of manufactured products. It influenced the development of several aspects of society including art and design education, international trade and relations and even tourism. The main attractions at Expos are the national pavilions created by participating countries. In more recent years participating countries have started to use expos as a platform to improve their national image through their pavilions.

<i>New York World's Fair (1939-40)</i>	Titled Tomorrow's World, the New York World Fair (1939-40) was one of the largest world's fair on all time. The fair was ostensibly a display of products, people, and ideas which its designers encapsulated in a variety of ways. The character of the fair was predominately 'utopian visions of the future' (Touring the Future, 2008). The Futurama exhibit at the General Motors pavilion, designed by Bel Geddes, received the most attention during the fair (Bel Geddes, 1940). 'Futurama was a massive 36,000 square-foot scale model of America in 1960, complete with futuristic homes, urban complexes, bridges, dams, surrounding landscape, and, most important, an advanced highway system' (Touring the Future, 2008). Futurama contributed American obsession with the automobile.
<i>Festival of Britain (1951)</i>	The Festival of Britain opened in May 1951 on the South Bank, London, was an attempt to give Britons a feeling of recovery and progress and to promote better-quality design in the rebuilding of British towns and cities following WWII. It also celebrated the centenary of the 1851 Great Exhibition (Banham & Hillier, 1976). The Festival comprised of a futuristic series of pavilions designed by some of the finest designers and architects of the time. The Dome of Discovery and the Skylon dominated the South Bank site. The Dome of Discovery, at the time the largest dome in the world, included sections including the Land, the Earth, Polar, the Sea, Outer Space, the Living World, and the Physical World. The Skylon was the vertical feature that was an abiding symbol of the Festival of Britain. The Festival put forward an optimistic and progressive view of Britain's future.

Fig. 2.27 Examples of manifestations of future thinking through design

2.7.1 Summary

This section has considered how design explores new ideas and direction through the creation of visions of the future in the form of concept models and prototypes. In some instances these activities are centred on a specific event – such as World Fairs – and seek to demonstrate the how organisations or nations address issues of issues of humankind, technology and innovation. Both the New York World's Fair (1939-40) and The Festival of Britain (1951) offered designers opportunities to create engaging visions of the future on a grand scale. These events created era defining exhibitions that were embraced by the public; presented a audience for some of the most forward looking design and manufacturing (at the time); and enhanced the profile of leading designers, architects and manufacturers on a scale unknown at the time. In such contexts, design is required to explore and communicate visions of the future to a broad audience. In doing so, design has to undertake future focussed activities. This provides additional evidence for the research proposition that:

- *Designers consider the future as an intrinsic aspect of the design process*

2.8 The Application of Design Futures in Design Practice

This section identifies the use of future thinking in contemporary design practice. It intends to demonstrate the increasing value design organisations place upon considering the future.

2.8.1 IDEO

IDEO, an international design consultancy, work to unite futures research with product development (Jensen, 2005; Brown, 2008–2009). IDEO have engaged with future orientated design for a number of years. For many they epitomise the effective manner in which design can be used as a catalyst when developing future propositions, be it a product, service or experience (Myerson, 2004; Jensen, 2005; Kelley and Littman, 2006). IDEO has been described by Fortune Magazine as the secret weapon of Silicon Valley and services clients worldwide such as Pepsi, Nike, BMW, Samsung, Seiko and Canon (Jensen, 2005).

Kelley details IDEO's rough-and-ready formula of building lots of crude prototypes and endorses their fast, fearless prototyping approach (Kelley, 2001). Rather than writing a report about a potential future design direction that a client can take or leave, he sees prototyping as a way of allowing clients to 'walk right in, experience things and take a view. You can get people to think in a new mode' (Kelley cited in Myerson, 2004). Kelley adds, 'design predictions help to change people's mindsets and are central to making companies behave in a more innovative way'. Building crude, approximate but usable models that can be engaged with and evaluated in use is central to IDEO's design process, encapsulated in their motto 'fail often in order to succeed sooner' (Myerson, 2004).

IDEO is at the forefront of a radical shift in the very concept of design, moving from inventing objects to analysing and reshaping the way environments and customs mould our experience (Stone, 2003). This shift from products to process, or in IDEO speak verbs to nouns, enables IDEO to sell its method for unleashing creativity applying it both to physical spaces and human behaviour.

IDEO has a passionate interest for designing speculative future concepts. According to Tim Brown in Myerson (2004) 'the speculative projects position IDEO as an intelligent company keen to generate fresh ideas and share insights across all of our offices and with our clients'. To learn as an organisation, IDEO experiment outside existing markets and technological constraints. These projects enable them to explore new materials or gain new types of experiences, or ways to make technology beautiful. Designers at IDEO are extremely curious. This curiosity may lead to discovery. 'The best design feels as though it has been discovered', says Nuttall in Myerson (2004).

A lot of big companies are curious about the future, but few have the right know-how and resources to conduct a design forecasting experiments by themselves. IDEO combines pure speculation with informed prediction. Their biggest skill is in achieving a balance between fantasy and practicality. This is very much part of their culture.

Although a large design organisation (500 employees worldwide), IDEO regularly collaborate with partner organisations to provide a comprehensive service to their clients.

Partners provide a range of services including technical, business and research support activities (Kelley & Littman, 2006; Brown, 2008).

IDEO typify an increasing breed of design and innovation organisations that are being called upon to rethink organisations purpose. Inherently future oriented in their approach, they seek to develop, in a collaborative and co-created manner, new products, services and systems that address tomorrow's challenges.

2.8.2 Philips – Visions of the Future

Dutch electronics manufacturer Philips undertook Visions of the Future in 1995/6 and represents an exemplar in terms of an integrated design and futures activity. The project explored possibilities for life and technology in the near future (10 years into the future). It examined the sense of acceleration of change - in our own lives and in many aspects of society. It considered what impact new technologies would have on individuals and communities, and what opportunities will they present to enhance and extend experiences. Many areas of expertise were brought together to propose directions for new products and services in different domains of life: Personal, Domestic, Public and Work, and Mobile (Marzano, 1999). Specialists from a wide range of fields were commissioned to contribute to the project and as such represented a diverse and expertly informed set of stakeholders. This project continues to be a reference point for design led futures.

Philips' High Design Strategic Futures has a strong multidisciplinary research component, and based upon that research, hypotheses about what consumers might value in the future are formulated. These hypotheses are filtered, tested in experiments, and submitted to experts in various fields for critique.

Marzano (2005a) states that Philips' High Design Strategic Futures method is scientific, at least in comparison with what is normally practised in the design world and claims that this approach avoids the subjectivity that typifies more traditional, intuitive approaches. Green (2007) adds that Philips' approach anchors the future and innovation in terms of people, and is used to trigger out-of-the-box thinking (Green, 2007). It is based upon researching, engaging with, co-creating, envisaging and re-conceptualising the future.

Three core competences underpin the implementation of Philips' approach: *understanding people*; *innovative integration*; and *design articulation* (Marzano, 2005a):

- *Understanding people* enables an analysis of current societies in terms of their key components and drivers, and the identification of emerging trends and movements, both in the short and long term. Social science methods are a key component of this analysis and underpin the development of hypotheses, directions, and strategies about what might constitute desirable future qualities of life for people in particular situations.

- *Innovative integration* develops new solutions for products, systems, or services that draw upon the competences of engineers, marketers, strategists, and designers. Combined with traditional design skills are sociological trends, media design business strategies, models and processes; as well as psychology and ergonomics. The aim here is to make decisions tangible to enable a collective understanding of mental images such that detailed discussion is possible.
- *Design articulation*, a more typical design competence, comes into its own when a clear concept has been developed. This phase is central to shaping that concept into a tangible, or at least viable, solution and can range from anything from a product or service.

The High Design Strategic Futures process is described by Marzano (2005a) thus:

Phase	Description
<i>Combine research findings</i>	<i>Combine research findings</i> in terms of social, cultural, and visual trends relevant to a particular target group. These trends are mapped against technological trends, combined with research undertaken by institutes and universities, and extrapolated into the future.
<i>Avoid historical bias</i>	<i>Avoid historical bias</i> as there is a natural tendency to base ideas about the future on what is known about the past. This is achieved by: (i) taking as axiomatic that a major driver in human development is the ambition to do everything, be everywhere, and know everything – with minimum effort, and (ii) take into account not only well established social trends, but also emerging and new trends to enable a dynamic picture of a situation, with all its tensions and interactions to be established.
<i>Create scenarios and visualisations</i>	<i>Create scenarios and visualisations</i> based upon all of this above input that are desirable, realistic future situations and experiences, and define the roadmaps that will lead to these visions of the future. Utilising personals, details scenarios are developed to specify what individuals might do in a particular circumstance and are laden with rich data and the nuances of real people, even though the personals are fictional characters.
<i>Filtering and validating</i>	<i>Filtering and validating</i> . The scenarios are tested in a two-phase process: (i) they are submitted to an international panel of experts for filtering and the ideas that emerge are then prototyped or visualised as life size objects that can almost be touched, accompanied by video clips of real people using them in plausible situations, and (ii) these visualisations are shown to selected representatives of the public at exhibitions and media presentations.
<i>Finding partners</i>	<i>Finding partners</i> is achieved by undertaking exhibitions and producing printed and online materials. This enables partners within the organisation and beyond to join in specific projects.

Fig. 2.28 Philips' High Design Strategic Futures (Marzano, 2005a)

Marzano maintains that real breakthrough innovations depend not only upon exploring the technological how, but more crucially the socio-cultural and psychological why behind people's needs and aspirations. It is from the combination of these two that organisations can derive the what, the when, the where, and the who. He claims that it is vital to explore the uncharted future landscapes of people's minds to tap into the richest sources of breakthrough innovations, and needs to be based upon a combination of research and liberated thinking that is then shared with consumers in realistic situations (Marzano, 2005a).

To achieve this end, Philips commission a range of organisation to contribute to their innovation programmes. This includes leading thinkers in and beyond design including technology, anthropology, trend and lifestyle research, as well as experts from the fields of technology and business

2.8.3 Common Characteristics of Design Futures' projects

The *Design for Future Needs* (2003) research project undertaken on behalf of the EC, identified the following common characteristics, and grouped under three headings:

Characteristic	Description
<i>Engage in some sort of participatory observation (first hand or through experts)</i>	Schneider (2005) states that 'engaging in some sort of participatory observation (first hand or through experts), design justifies its actions by giving a central role to the user. Approaching, understanding and surveying consumers/users desires and habits are an essential activity. Trained researchers observe people, they tend to look for repeated behaviour to identify insights. When designers observe, they gather insights in more random way and imagine them in a future context. Nevertheless, some inspiration is taken from ethnography, either by including ethnographers in the early phases of a project, or by doing simply more real-life and contextual observations. 'Ethnographic user research... permits project teams to distinguish between what users say they do and what they really do in their everyday lives' (Linington, 2001).
<i>Creating representations at an early stage, of all kinds</i>	Various representations, including sketching, modelling and prototyping are seen as absolutely necessary, mixed together if needed - from quick and dirty solutions towards more elaborate solutions, guided and controlled by the scenario process and by permanent negotiation of all participants. Concepts enable possibilities to be made concrete that a committed team of people can then make happen. This iterative process is described as 'make it, evaluate it, modify it' (Schneider, 2005). Representations assist in developing a common understanding of a project – seen as a necessity – often through the creation of a hyper-realistic but fictitious prototypes. It could well be because these (re)presentations rely: (i) on a shared visual language, and (ii) on the possibility to project a physical relation with a full scale prototype, that the diversity of persons that will be involved in the project can build a common ground (Schneider, 2005).
<i>Set up the conditions of some sort of dialogue</i>	The variety of design methods allow many people to be included in projects – not just members of the design and development team and includes clients, researchers, admin staff etc. Design is open to debate, even at the earliest stages, and teamwork can be truly interdisciplinary. Design concepts create a constructive approach to future and stimulate dialogue and can assist organisations to reconsider aspects of their operations that hitherto had been 'set in stone'. In this context it supports organisational change as well as project focussed developments. Achieving buy-in from the whole project team is a by product of future focussed design undertakings, even if the project doesn't reach the market place. Schneider (2005) identifies that by 'allowing heterogeneous groups of actors to envision, build, and communicate a shared understanding of the future, design fosters adaptive and proactive approaches to change in society'.

Fig. 2.29 Common characteristics of future focussed design projects (adapted from Schneider, 2005)

2.8.4 Summary

This section has presented a brief snapshot of the use of futures thinking approaches in design practice. Due to commercial sensitivities, many organisations do not publicise their activities in this area as they are concerned that this will enable competitors to exploit such a situation. Access to commercially sensitive materials is problematic and presents a challenge to the research design.

It is clear that design organisations do not always possess all the requisite skills to undertake future oriented projects in sufficient depth and breadth. Evidence confirms that they regularly collaborate with partner organisations to provide a comprehensive service to their clients. This provides evidence for the research proposition, namely:

- *External agencies provide future based knowledge for designing*

2.9 Discussion

This chapter has presented an analytical literature review of approaches to anticipating the future, and how design engages with these approaches. It used two main sources of literature: (i) literature from the field of future studies; and (ii) literature from the field of design, and was supplemented with additional sources as appropriate.

A number of key considerations have been identified:

- *Similarities between futures thinking and design* - There are similarities between the conceptual approaches used in futures thinking and design. Irmak (2005) identifies both historical and contemporary similarities between these two fields particularly in the use of scenarios. Futures thinking involves looking into the future in order to better understand the changing interrelationships between man, society, and the environment (Masini, 2006), while design has been described as 'the human capacity to shape and make our environment, to serve our needs, and give meaning to our lives'. (Heskett, 2002). Both are employed for social and commercial benefit (DFFN, 2003). Both disciplines are inherently normative in their approach and share much in their concepts and methodology. Fig. 2.31 outlines identified similarities between futures thinking and design (see below).
- *Rapid societal change is creating new challenges for design* – The rate of societal change is creating new challenges for design (Krippendorff, 2006). Global changes in society require continuous adaption, and the contextual awareness that design fosters could prove useful (Schneider, 2003). Various commentators (Margolin, 2007; Marzano, 2005; Green, 2007; Heskett, 2002) identify a range of design challenges driven by rapid societal changes (social, economic, technological, etc). Futures thinking may provide design with some support in this area as it key focus is the consideration and conceptualisation of the future. Glenn (2003a) believes

that the increasing complexity and acceleration of change decreases the lead-time for decisions and makes previous expectations less reliable. Forecasting increases lead-time between potential events and current planning.

- *Design has the ability to influence future events* – Ogilvy (1996, 2002) and Rescher (1997) contest that predicting the future is an inescapable part of human destiny, while Glenn (2003a) adds that as human capacity has evolved, our choices increasingly shape the future. Krippendorff (2006) claims that designers consider possible futures as part of what they do within the design activity:

...worlds that can be imagined and could be created in real time. They [designers] are concerned less with what has happened, what already exists, or what can be predicted by extrapolations from the past than what can be done. Designers' most outstanding ability is not being afraid to explore new ideas, to challenge theories that claim that something cannot be done, or to question what is commonly taken for granted. (Krippendorff, 2006)

Thus, it is contested that design activity impacts upon future events, shapes the way we live our lives, and contributes to its creation. Design has the ability to influence future events.

- *Design can make the future tangible* - For future thinking to be successful, the future it generates must be imaginable and as such techniques of visualisation are key. Designers engage with future thinking-type data informally or intuitively during the course of their work (DFFN, 2003). Designers routinely translate it into visible or tangible form. DFFN (2003) claim that it's in its ability to produce more compelling visions that design can increase the impact of future thinking. Ultimately design can help make us comfortable with the sometimes uncomfortable picture of the future that emerges from future thinking.
- *Organisations can project the image of being innovators by using future focussed design* – Backed by future thinking research, an organisation can feel charged to put forward a dramatic innovation, which has the potential to seize the public's imagination (Rodríguez Ramírez, 2007a). Scheneider (2003) claims that 'whereas in the past consumers might have been confused by the presentation of something that is merely a representation of future thinking rather than a forthcoming project, the public can appreciate what's going on'. Such concepts can be used to: (i) elicit feedback for the development of later, real-market designs, and (ii) serve a valuable function of enhancing the company's image as an innovator.
- *Futures thinking can contribute to project definition* - The Fuzzy Front End (FFE) is increasingly being used to describe the early stages of the innovation process where ideas form and it is critical to defining the nature of the problem that is being addressed through design (Rhea, 2003). There is a level of ambiguity at this phase of the new product development process, and the process is largely unstructured (Design Council, 2007). Futures thinking can assist design in the discovery phase of the design process. Krippendorff (2006) states that designers

consider possible futures from the outset of projects by 'searching the present for available paths to desirable futures', and adds 'one of the strengths of designers is to reconceptualise, recontextualise, and question what previously was assumed fixed and thereby prove limits to be malleable and artificial' (Krippendorff, 2006).

2.9.1 Futures thinking and design

Futures Thinking		Design
Visioning	Visioning preferred futures is a valuable method in dealing with the future that can take us beyond the limitations of prediction based on existing trends and act as an inspiration to innovation and a better future (May, 2006). Visioning is used to create a preferred future by projecting values and aspirations into the future, then describing that future succinctly.	Concepting involves experimenting with alternative future product concepts through explorative and creative design (Keinonen, 2006). Rodríguez Ramirez (2007b) suggests that companies can use conceptual designs (the output from concepting) as tools that help them develop an image of innovation, and as stepping stones for future developments.
Environmental Scanning	Environmental scanning involves scanning the horizon to identify new developments that can challenge past assumptions or provide new perspective to future threats or opportunities (Gordon & Glenn, 2003a). It is the effort to identify and understand those phenomena or aspects of the world that are most relevant (Cornish, 2004) and use this information to inform future decisions.	Competitor analysis is used in the early stages of New Product Development to understand the relationship of a potential new product to competitive products (Ulrich & Eppinger, 2000). Sometimes termed benchmarking, this approach allows development teams to agree on the detailed positioning of its product relative to competing products.
Wildcards	Wildcard events are high-impact, low-probability events that happen quickly which, if they occurred, would cause major disruption and have very high impact (Petersen, 1997). The term often refers to a future event that is unlikely during the period of time being considered but would have great consequences if it did (Cornish, 2004; Barber, 2006).	When competitors launch products that wipe away the competition, they are events that have high-impact but were not expected. These 'killer-products' can have a wide ranging impact upon an organisations strategy, sometimes resulting in me-too approaches that seek to replicate the competitors success, and the shelving of projects that are now too late to market.

<p>Trends</p>	<p>Schwartz (2005) perceives a trend as an ongoing fundamental societal change over a longer period of time. Trends provide a path for us to follow from the present world into the future world because they indicate conditions that we will probably have to deal with in the years ahead (Voros, 2003). Trends are used in many areas of futures thinking. They are 'the tip of the socio-cultural iceberg' – they are the manifestation of much deeper rooted changes in society.</p>	<p>Trends and socio-cultural dynamics</p>	<p>In design trend research looks at the past and the present, to say something about the future (Margolin, 2007). Socio-cultural trends research is widely used as a motor in the design and innovation process (Power & Tangsanitkul, 2005). Done well, trend research can help inform design briefs that get to the heart of problems and generate insights into customers and users future needs (Woudhuysen, 2006). Jensen (2005) claims that organisations should use trend studies actively, and in that way develop innovative and timely products.</p>
<p>Scenarios</p>	<p>As the archetypal product or futures thinking, scenarios describe in some detail a hypothetical sequence of events that could lead plausibly to the situation envisaged (Kahn, 1967). Scenarios are not meant to represent anything other than a draft, a sketch of a hypothetical future and enable a wide range of possible future to be evaluated.</p>	<p>Design concepts</p>	<p>In the early stages of the design and development process, it is normal to create a wide number of potential design directions (Ulrich and Eppinger, 2000). These usually take the form of design concepts typically as sketches and simple prototypes and are evaluated before taking further into design development (Cross, 2000). DFFN (2003) state that a plethora of future focussed-based design visualisations of the future is better than one.</p>
<p>Scenarios</p>	<p>Voros (2003) describes scenarios as a narrative structure outlining, to a greater or lesser degree of detail, how certain dynamics of change occur over time. It is an analysis cast in narrative form, and is thereby able to borrow heavily from the human propensity to remember well-crafted stories and plots with relative ease (Voros, 2003). The search for a strong central image or metaphor to make the scenario memorable and organise the information collected is a key part of the work for some scenario practitioners (Flowers, 2003).</p>	<p>Storyboards</p>	<p>While storyboards were initially used as a way of defining a sequence of events in a linear form they have more recently been employed to relate a possible scenario of use where aspects of use are explored as part of the story (Mavrommati, 2001). In this way storyboards can assist in the definition of basic design decisions and interface issues. Storyboards are well used in design development as a tool for explaining not just what a proposal is, but how its use is envisaged, etc.</p>

Fig. 2.30 Similarities between futures thinking and design

Although the process taken in gathering criteria was rigorous as was feasible, there are some potential shortcomings.

A limitation of this chapter is the availability of material that directly deals with the use of future thinking in design (theory and practice). As previously stated, much future focussed design activity is undertaken in design practice. Where these approaches are disseminated, organisations talk much about *what* they are able to do for clients in terms of future led design, but provide limited discourse with regard to *how* they actually undertake these activities. Commercial sensitivities may be in part responsible for this lack of detail. In addition, commercial organisations tend to place a positive gloss or spin upon their activities thus this may not represent a true picture of the actual events.

2.10 Chapter summary

This chapter has presented an in depth literature review exploring approaches to anticipating the future, and how design engages with these approaches.

As already identified in chapter 01, the development of the research questions, definition of the research problem and establishment of the overall research aim was established before commencing this investigation, and before the literature review for this thesis was undertaken. The research questions were used to guide these activities and assist in the identification of a number of research propositions that aims to assist in answering the research questions.

2.10.1 Research propositions

The literature review provided a theoretical understanding of approaches to anticipating the future, and how design engages with these approaches. This theoretical base informed and enabled the development of six research propositions:

RP01: Designers consider the future as an intrinsic aspect of the design process

RP02: Designers use futures thinking approaches within the design process

RP03: There are no commonly accepted approaches in futures thinking in the design discipline

RP04: Designers appropriate futures thinking methods and techniques from other areas and augment them to support design activity

RP05: External agencies provide future based knowledge for designing

RP06: Futures thinking approaches are increasingly being employed in design

The research propositions were developed to enable the interrogation of the research questions. They provide an opportunity to inform and provide structure for the data collection.

2.10.2 Research aim

This chapter will conclude with the explicit statement of the research aim. The central aim of this research is to investigate the role of futures thinking in design. It aims to address the research problem (sec.1.3) through the interrogation of three research questions (sec.1.4). The research problem that this thesis addresses is *that we don't really understand how designers consider the future within the design process while creating desirable and acceptable next-next generation products and services, thus we are unable to explain this skill and take advantage of it.*

03

Research Methodology

3.0 Introduction

The main objective of this study is to address three research questions that seek to investigate the role of futures thinking in design through the exploration of six research propositions. This chapter contains a detailed discussion of the research methods available, the theoretical basis behind these approaches, and a justification of the actual methods employed. It investigates the possible ways of solving the research questions and linked propositions by investigating the means by which other research methods have been deployed. Next, it describes the chosen set of methods and the manner in which they were employed.

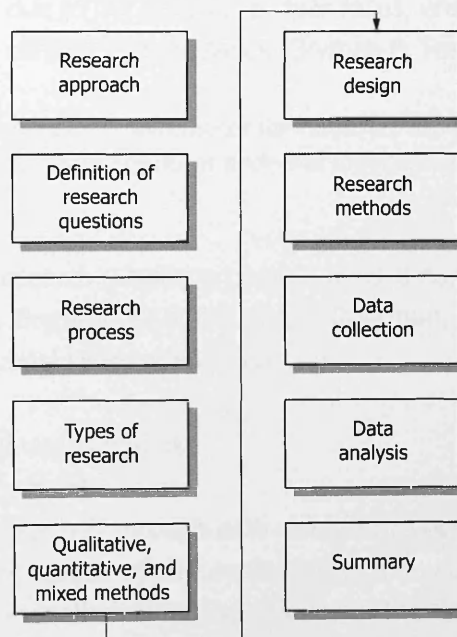


Fig. 3.0. Chapter map for research methodology

3.1 Research approach

This section details the research approach adopted for this study. Numerous decisions were made in relation to the actual research undertaken as well as consideration of the potential research methods available but not utilised within the study. For example, six to eight in-depth case studies were considered as the primary research approach but this would have provided context specific rather than more generalizable findings. Case studies would have provided an in-depth understanding of a specific situation and provided access to track one project in detail (in each case). As outlined in the motivation for this study (sec.1.2), the desire to develop an understanding of the manner in which designers consider the future such that this can subsequently inform design practice required empirical evidence that could support generalizable findings. A series of semi-structured interviews, if undertaken in sufficient numbers, would provide a broader evidence base to draw out generalizable findings. In addition as Yin (2009) notes, case studies are more appropriate for *how?* and *why?* research questions. This study has one *how?* and two *what?* questions thus case studies were deemed an inappropriate research method.

The theoretical base that underpinned the research approach adopted is now considered.

3.1.1 Research questions

Research often starts with a general area of interest but this broad area of interest needs to be narrowed to a tighter focus, moving from a general research area down to specific research questions. Bryman & Teevan (2005) state that 'this movement acknowledges that the research cannot answer all of the research questions that occur'. The narrowing of focus is not just based upon a pragmatic approach due to time and resource limitations, it is necessary due to the need for a clear focus, ensuring that research questions are related to a coherent set of issues (Bryman & Teevan, 2005).

'Research questions set realistic boundaries for research; having none of poorly formulated research questions results in poor and unfocussed research' (Bryman & Teevan, 2005:21)

Lewis (2003) states that research questions need to meet a number of requirements (a position also supported by Bryman, 2008; Marshal & Rossman, 1999; Morse, 1994; and Pole & Lampard, 2002), namely they need to be:

- clear, intelligible and unambiguous
- focussed, but not too narrow
- capable of being researched through data collection: not too abstract, or questions which require the application of philosophy rather than data
- relevant and useful - whether to policy, practice or the development of theory
- informed by and connected to existing research or theory, but with the potential to make an original contribution or fill a gap

- feasible, given the resources available
- of at least some interest to the researcher

Marshall and Rossman (1999) state that the researcher will have theories or hunches which are developed through the systematic review of existing theory and research, while Mason (2002) observes that as this process progresses, the researcher becomes clearer about the intellectual puzzle and about what exactly it is they want to describe, explain, and about the more detailed questions they wish to address. Additionally Lewis contends that 'although these early ideas inform the initial design and data collection, the relationship between design, data and theory is a multi-directional one' (Lewis, 2003).

The research questions for this study have been defined thus (see chapter 02):

- RQ1: How do designers engage with the future within the design process?
 RQ2: What futures thinking methods are employed in the design process?
 RQ3: What futures thinking methods do designers employ?

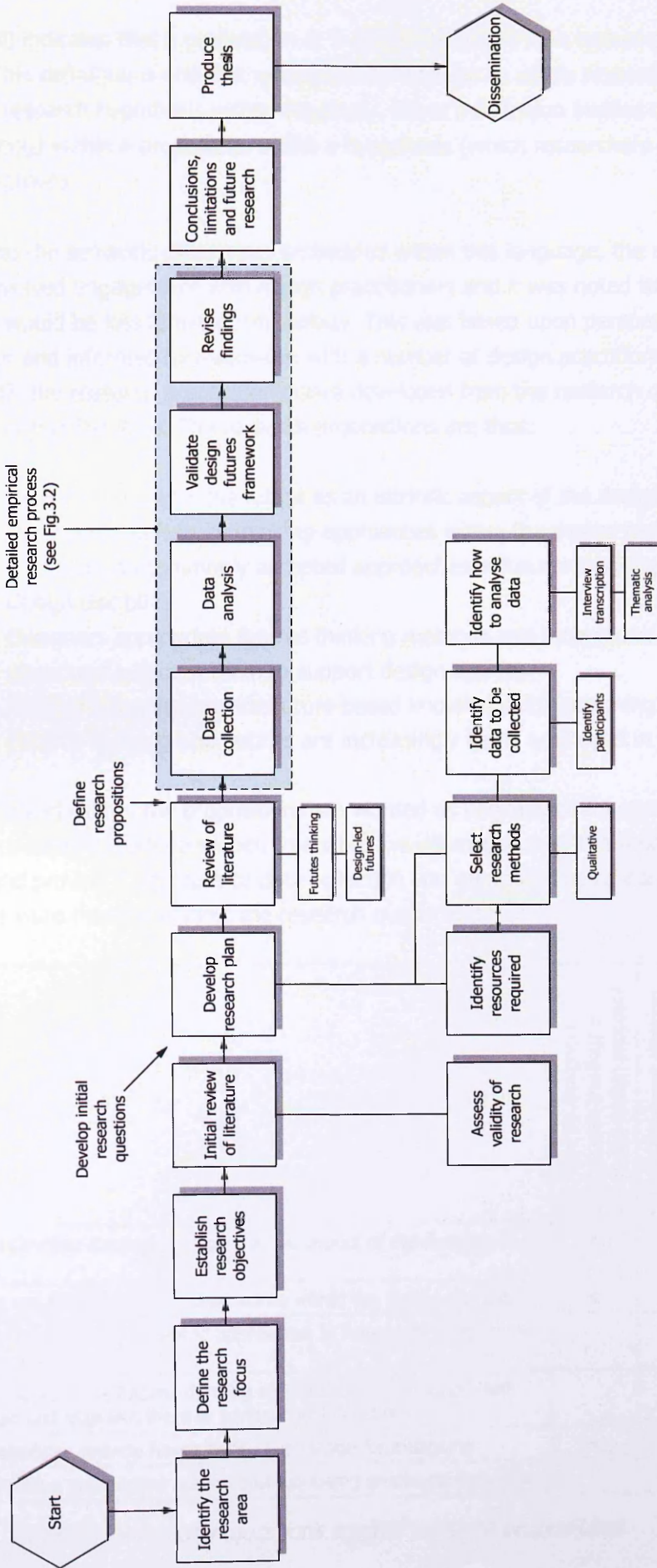
As defined by Lewis (2003), research questions need to be 'focussed, but not too narrow', 'relevant and useful', 'capable of being researched through data collection', and 'informed by and connected to existing research or theory, but with the potential to make an original contribution'. These principles assisted in the development of research propositions that are linked to the overall research questions but were developed to provide structure to the research study while enabling flexibility to both the data collection and analysis. The Oxford English Dictionary (2009) defines proposition as:

'A statement of assertion that expresses a judgement or opinion.'

The origin of proposition is from the Latin *propositio* which (based upon propound) means:

'To put forward and idea of theory for consideration by others.'

The decision to utilise the propositions rather than a hypotheses, which the OED defines as 'a supposition of proposed explanation made on the basis of limited evidence as a starting point for further investigation', was driven by the intent to employ the research propositions as a framework within empirical data collection. A hypothesis is the proposed explanation that will be used for further investigation, it was deemed less appropriate than a proposition which expresses a judgement or opinion to underpin the research approach. The expression of an *opinion* rather than an *explanation* was central to the decision to employ propositions rather than hypotheses as the research should develop a further understanding of the research issues.



∞ Fig. 3.1 Research process for thesis (cf. Carmichael (2002) adapted from Fellows & Liu (1997))

Oliver (2010) indicates that a proposition is 'a statement which links two or more concepts'. This definition is one that underpins the decision to utilise research proposition rather than research hypothesis within this study. Oliver's definition implies no weighting (right or wrong) within a proposition unlike a hypothesis (which researchers often seek to prove or disprove).

In addition to the semantic differences embedded within this language, the research approach involved engagement with design practitioners and it was noted that the term hypotheses would be less familiar terminology. This was based upon personal experience of the author and informed by discussion with a number of design practitioners. As noted in chapter 02, the research propositions were developed from the research questions in the context of the literature. The research propositions are thus:

- RP01: Designers consider the future as an intrinsic aspect of the design process
- RP02: Designers use futures thinking approaches within the design process
- RP03: There are no commonly accepted approaches in futures thinking in the design discipline
- RP04: Designers appropriate futures thinking methods and techniques from other areas and augment them to support design activity
- RP05: External agencies provide future based knowledge for designing
- RP06: Futures thinking approaches are increasingly being employed in design

For simplicity and clarity, the propositions are worded as positive, direct statements. The research propositions were developed to enable the interrogation of the research questions and provide a structure to data collection and analysis. The research propositions were mapped against the research questions thus:

	Q1: How do designers engage with the future within the design process?	Q2: What futures thinking methods are employed in the design process?	Q3: What futures thinking methods do designers employ?
1) Designers consider the future as an intrinsic aspect of the design process	x		x
2) Designers use futures thinking approaches within the design process	x	x	x
3) There are no commonly accepted approaches in futures thinking in the design discipline		x	x
4) Designers appropriate futures thinking methods and techniques from other areas and augment them to support design activity			x
5) External agencies provide future based knowledge for designing	x		
6) Futures thinking approaches are increasingly being employed in design			x

Fig. 3.2 Mapping of research questions against research propositions

Before considering the research design and research methods, there will be discussion of the type of and purpose of research that can be undertaken.

3.1.2 Types of research

Before discussing specific research methods, the overall nature or purpose of the research will be considered. Yin (2009) and Neuman (2007) identify three main categories of research based upon what the researcher is trying to accomplish - explore a new topic, describe a phenomenon, or explain why something occurs (Babbie, 1998; Bailey, 1987; and Churchill, 1983):

Exploratory	Descriptive	Explanatory
<ul style="list-style-type: none"> ▪ Become familiar with the basic facts, setting, and concerns. 	<ul style="list-style-type: none"> ▪ Provide a detailed, highly accurate picture. 	<ul style="list-style-type: none"> ▪ Test a theory's predictions or principle.
<ul style="list-style-type: none"> ▪ Create a general mental picture of conditions. 	<ul style="list-style-type: none"> ▪ Locate new data that contradict past data. 	<ul style="list-style-type: none"> ▪ Elaborate and enrich a theory's explanation.
<ul style="list-style-type: none"> ▪ Formulate and focus questions for future research. 	<ul style="list-style-type: none"> ▪ Create a set of categories or classify types. 	<ul style="list-style-type: none"> ▪ Extend a theory to new issues or topics.
<ul style="list-style-type: none"> ▪ Generate new ideas, conjectures, or hypotheses. 	<ul style="list-style-type: none"> ▪ Clarify a sequence of steps or stages. 	<ul style="list-style-type: none"> ▪ Support or refute an explanation or prediction.
<ul style="list-style-type: none"> ▪ Determine the feasibility of conducting research. 	<ul style="list-style-type: none"> ▪ Document a causal process or mechanism. 	<ul style="list-style-type: none"> ▪ Link issues or topics with a general principle.
<ul style="list-style-type: none"> ▪ Develop techniques for measuring and locating future data. 	<ul style="list-style-type: none"> ▪ Report on the background or context of a situation. 	<ul style="list-style-type: none"> ▪ Determine which of several explanations is best.

Fig. 3.3 Purpose of research (Neuman, 2007)

The goal of exploratory research is to formulate more precise questions that future research can answer. Gibbs (2002) claims that exploratory research is well suited to break new ground while Neuman (2007) states that exploratory research rarely yields definitive answers. Exploratory research focussed upon the *what* questions (Neuman, 2007; Bryman; 2008; Yin, 2009). 'Exploratory research must be creative. Open minded, and flexible; adopt an investigative stance; and explore all sources of information' (Neuman, 2007). Exploratory researchers frequently use qualitative techniques for gathering data.

Descriptive research presents a picture of the specific details of a situation, social setting, or relationship without investigating causal relationships (Yin, 2009). The researcher begins with a well-defined subject and conducts research to describe it accurately (Neuman, 2007). The outcome of a descriptive study is a detailed picture of the subject (Zikmund, 1999). Descriptive research focuses on *how* and *who* questions (Neuman, 2007) while Zikmund (1999) stated that descriptive research considers the *where* and *when* questions. 'Exploring new issues of explaining why something happens is less of a concern for descriptive researchers that describing how things are' (Newman, 2007). Descriptive research utilise most data-gathering techniques.

Explanatory research goes beyond focussing upon a topic and providing a picture of it, explanatory research looks at causes and reasons and considers *why* things occur (Neuman, 2007). Explanatory research normally build upon exploratory and descriptive research and 'goes on to identify the reason something occurs' (Neuman, 2007) and consider *how* certain things occur. Explanatory research may lead to the use of either, or both, qualitative and quantitative research approaches (Yin, 2009).

Research studies usually have multiple purposes but one purpose is usually dominant (Neuman, 2007). The nature of the research within this study, an investigation of the role of futures studies within design, cannot be simply defined as only one of the above types of research – exploratory, descriptive or explanatory – rather is a combination of elements of all three. It considers *what* the role of futures thinking is in design and seeks to create a general mental picture of conditions; it considers *how* futures thinking is utilised in design by clarifying a sequence of steps or stages within the design process; is also seeks to consider the *where* and *when* by providing a detailed, highly accurate picture and report on the background or context of a situation; and finally it seeks to detail *why* future thinking is employed in design by linking issues or topics with a general principle. As noted by Neuman (2007) research studies usually has multiple purposes although one is dominant. This study takes a largely descriptive purpose yet engaging with both exploratory and explanatory perspectives. In this way it does not assume one dominant purpose.

This section has considered the type of and purpose of research that can be undertaken. The next section will discuss qualitative and quantitative research approaches.

3.1.3 Qualitative and quantitative approaches

The most common paradigm that researchers have to consider are those termed qualitative and quantitative (Blaxter et al, 2006). The qualitative and quantitative paradigms offer 'a basic framework for dividing up the knowledge camps' (Blaxter et al, 2006). Creswell (2009) contends that a key choice for researchers is to select between qualitative and quantitative approaches, and defines these approaches as follows:

'A qualitative study is an enquiry process of understanding a social or human problem, based upon building a complex, holistic picture, formed with words, reporting detailed views of informants, and conducted in a natural setting.' (Creswell, 2009:233)

'A quantitative study is an enquire into social or human problem, based on testing a theory composed of variables, measured with numbers, and analysed with statistical procedure in order to determine whether the predictive generalizations of the theory hold true.' (Creswell, 2009:232)

Punch concisely summarises these approaches as:

'Quantitative research is empirical research where the data are in the form of numbers. Qualitative research is empirical research are not in the form of numbers.' (Punch, 2000:3)

The characteristics of these approaches have been studied by many researchers (for example Kumar, 1999; Punch, 2005; Bryman & Teevan, 2005; Creswell & Clark, 2006; Creswell, 2009) with some researchers focussing upon qualitative approaches (such as Silverman, 2005 & 2006, Gibbs, 2007; Creswell, 2007; Richie & Lewis, 2003) or quantitative approaches (such as Curwin & Slater, 2007; Balnaves & Caputi, 2001; Maxim, 1999).

Miles and Hubberman (1994), Creswell (2009), and Bryman and Teevan (2005) declare that qualitative research tends to be concerned with words rather than numbers. Creswell (2009) distinguishes between quantitative and qualitative approaches stating that, quantitative research utilises closed-ended questions (quantitative hypotheses) rather than open-ended questions (qualitative interview questions). Bryman and Teevan (2005) detail the characteristics of qualitative and quantitative approaches thus:

- Qualitative research is characterised by an inductive view of the relationship between theory and research, an epistemological position described as interpretivist (focussing upon understanding the social world by examining the participants' interpretations of the world), and an ontological position described as constructivist which 'implies that social life is an outcome of the interactions between individuals, rather than a phenomenon *out there* and separate from those involved in the construction' (Bryman & Teevan, 2005).
- Quantitative research is characterised by a deductive relationship between theory and research, a predilection for a natural science approach (in particular positivism where natural science methods are applied to the study of social reality), an empiricist approach, and an objectivist conception of social reality (Bryman & Teevan, 2005).

Bryman and Teevan (2005) highlight potential problems with the ways in which qualitative and quantitative approaches are communicated. Often qualitative research is described by how it differs from quantitative research. Bryman and Teevan note that 'a potential problem with this tactic is that qualitative research ends up addressed not in terms of what it is but in terms of what quantitative research is not' (Bryman & Teevan, 2005:145).

The respective merits of qualitative and quantitative approaches are dependent upon the research question(s) being addressed and as Silverman (2005) states 'no method of research, quantitative or qualitative, is intrinsically better than the other'. He adds:

'We should never assume that qualitative methods are intrinsically superior. Indeed, a quantitative approach may be more appropriate to the research problem in which we are

interested. So, in choosing a method, everything depends upon what we are trying to find out.' (Silverman, 2005:6)

Hakim (2000) simply states:

'No single study [qualitative or quantitative] is universally appropriate for all research questions'. (Hakim, 2000:12)

As articulated by Robson (2002), research methods are informed by the research questions, while Yin (2009) suggests that the type of research methods depends first upon the form of research question, but then on the opportunity or need to control behavioural events and also on the time frame under review.

Several writers have contrasted quantitative and qualitative research highlighting their differences (such as Hammersley, 1992). The following summarises the common contrasts between quantitative and qualitative research:

Numbers (quantitative)	Words (qualitative)
Points of view of researcher	Points of view of participants
Researcher distant	Researcher close
Theory testing	Theory emergent
Static	Process
Structured	Unstructured
Generalisations	Context understanding
Hard, reliable data	Rich, deep data
Macro	Micro
Behaviour	Meaning
Artificial settings	Natural setting

Fig. 3.4 Common contrasts between quantitative (numbers) and qualitative (words) research (Bryman & Teevan, 2005)

If the research is concerned with understanding how the world is seen by the views of the subjects of a study, a qualitative approach should be considered (Miles & Hubberman, 1994). If the researcher is interested in exploring a particular set of variables where the aim is to predict an effect from developed theory, we a quantitative approach should be employed (Robson, 2002). This research is concerned with the former thus a qualitative approach is appropriate.

Creswell (2009) states that qualitative methods are said to be favoured by those who assume that the opinions and bias of both the researcher and research subjects should be an admitted and reported part of the study. The language used should be personal and emerge from the particular study. Additionally Creswell (2009) reports that quantitative methods employ experiments and surveys to avoid bias and the researcher

will avoid personal contact. The language here is impersonal and concentrates upon evidence and not motivations.

This research study seeks to investigate the role of futures thinking within design. As identified through the literature, there is limited published evidence regarding the role of futures thinking in design. Creswell (2009) proposes that 'if a concept or phenomenon needs to be understood because little research has been done on it, then it merits a qualitative approach'. This study intends to collect empirical evidence of the role of futures thinking within design via direct contact with proponents of design-led futures. The real-world focus of the data collection is suited to qualitative methods, such as interviews or ethnography, rather than quantitative methods, such as experiments and surveys (Robson, 2002).

A qualitative approach is advocated as this study seeks to 'understand how the world as seen by the views of the subjects of a study' (Miles & Hubberman, 1994). As claimed by Robson (2002) 'qualitative studies are more flexible' and 'the design evolves as the study proceeds'. This flexibility is seen by Robson as crucial to solve real world problems. Miles and Hubberman (1994) maintain that:

'...good qualitative data are more likely to lead to serendipitous findings and new integrations; they help researchers to get beyond initial conceptions and to generate or revise frameworks'. (Miles & Hubberman (1994:1)

and

'...the findings from qualitative studies have a quality of "undeniability". Words, especially organised into incidents or stories, have a concrete, vivid, meaningful flavour that often proves far more convincing to a reader than pages of summarised numbers'. (Miles & Hubberman (1994:1)

Creswell (2009) notes that 'qualitative approaches allow room for innovative and to work more within researcher-designed frameworks'.

This section so far has described and discussed quantitative and qualitative research, yet there is a third approach that combines both of these approaches. Mixed methods research is:

'...an approach to inquiry that combines or associates qualitative and quantitative forms of research. It involves philosophical assumptions, the use of qualitative and quantitative approaches, and mixing of both approaches in a study' (Creswell, 2009:203)

Creswell and Clark (2007) state that although mixed methods research is seen by some as a new approach, 'researchers for many years have collected both quantitative and qualitative data in the same studies. However to put both forms of data together as a distinct research design or methodology is new'. The mixing together of data is a unique

aspect of mixed methods research and by mixing the datasets, quantitative and qualitative, 'the researcher provides a better understanding of the problem than if either dataset had been used alone' (Creswell & Clark, 2007). There are three ways in which the mixing occurs:

'...mixing or converging the two datasets by actually bringing them together, connecting the two datasets by having one build on the other, or embedding one dataset within the other so that one type of data provides a supportive role for the other dataset'. (Creswell & Clark, 2007:7)

As already identified within this section, the research questions are most appropriate to qualitative research approaches. As such the use of mixed method research is not appropriate as there is not a suitable mechanism for obtaining a quantitative dataset.

The next section will now consider deductive and inductive approaches to theory generation within research.

3.1.4 Deductive and inductive approaches

In the development of any theory within sciences and applied sciences, two major approaches have evolved: the analytic method termed theory-then-research (deductive) approach, and the synthetic research-then-theory (inductive) approach (Reynolds, 1971). Deductive and inductive theoretical perspectives are traditionally aligned with quantitative and qualitative approaches respectively (Bryman, 2008). Deductive and inductive approaches are defined by Bryman and Teevan (2005) as follows:

- Deductive theory – on the basis of what is known about a particular topic and of theoretical consideration in relation to it, the researcher deduces a hypothesis (or hypotheses) that must then be subjected to empirical study.
- Inductive theory – the process of induction involved drawing generalizable inferences out of observations and collected data. Theory is the outcome of the research rather than the starting point.

The deductive approach begins by developing a theoretical structure, from which hypotheses are derived and tested (Reynolds, 1971; Nachmias & Nachmias, 2007) employing research to move from hypothesis to implications. The deductive approach seeks to draw conclusions logically from already established ideas or theories (Bryman & Teevan, 2005). Within the use of a deductive approach 'either the hypothesis is accepted and the theory is supported or it is rejected and the theory is changed' (Henderson, 1988). A deductive approach is normally associated with quantitative research methods (Bryman, 2008).

The inductive approach utilises a research-then-theory perspective in which research is conducted before the theory is developed (Reynolds, 1971; Bryman, 2008). The inductive approach seeks new theories rather than building upon current theories by testing

hypotheses (Corbin & Strauss, 2008). Henderson (1988) states that when utilising the inductive approach 'a conceptual pattern of the whole is built, and theoretical statements are developed from the patterns identified'. An inductive approach is normally associated with qualitative research methods (Bryman, 2008).

The conceptual differences between deductive and inductive approaches are denoted below (Bryman & Teevan, 2005):

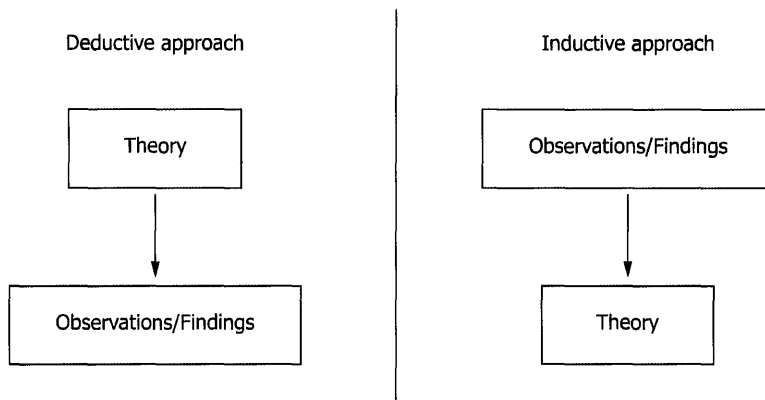


Fig. 3.5 Deductive and inductive approaches to the relationship between theory and research (Bryman & Teevan, 2005)

The use of a deductive approach provides some researchers with a level of confidence as 'there is a comforting logic to the idea of developing theories and testing them' as 'people commonly think of theories as things that are quite illuminating but in need of testing before they can be considered valid and useful' (Bryman & Teevan, 2005). A number of authors advocate the use of a combination of deductive (theory-then-research) and inductive (research-then-theory) approaches (Henderson, 1988; Nachmias & Nachmias, 2007; Bryman & Teevan, 2005; Creswell, 2009; and Bunge, 1967 for example). In fact the deductive approach ordinarily involves an inductive aspect – when researchers examine their data and evaluate the implications of their findings for the theory that first prompted the whole exercise (Bryman & Teevan, 2005). Meheus (2004) claims that most reasoning processes integrate inductive and deductive approaches, enabling researchers to 'study a variety of reasoning processes in a unified framework'.

Bryman and Teevan (2005) state that 'to a large extent, deductive and inductive strategies are possibly better thought of as tendencies rather than as binary choices, one or the other'. Commentators state the boundaries between deductive and inductive approaches are not always explicit as often stated in methodological literature, a position highlighted by Eisenhardt and Graebner (2007) who claim that 'inductive and deductive logics are mirrors of one another, with inductive theory building from cases producing new theory from data and deductive theory testing completing the cycle by using data to test theory'.

The principal aim of this study is to investigate of the role of futures thinking in design by considering three research questions through the exploration of research six propositions. As this study seeks to explore the research questions via the investigation of research propositions, it could be claimed that this study is adopting a deductive approach (theory-then-research), yet the primary research methodology of is qualitative, i.e. normally associated with inductive approaches (research-then-theory) (Bryman & Teevan). The study will adopt a combination of deductive and inductive approaches employing qualitative research methods.

3.1.5 Research design

Research design is 'concerned with turning research questions into projects' (Robson, 2002). Hakim (2000) asserts that 'research design is about aiming in the right direction, getting your bearings right, and making sure you are adequately equipped to get there and back'. Authors such as Silverman (2005 & 2006), Gibbs (2007), Wolcott (2009), Richie and Lewis (2003), and Grbich (2007) claim that research design should flow from the research question(s).

'The general principle is that the research strategy or strategies, and the methods or techniques employed must be appropriate for the questions you want to answer.' (Robson, 2002:80)

'Research designs are plans and the procedures for research that span the decisions from broad assumptions to detailed methods of data collection and analysis' (Creswell, 2009: 03).

The selection of a research design is based upon the nature of the research problem of issue being addressed, the researcher's personal experiences, and the audiences for the study (Creswell, 2009). A key purpose of research design is to guide the researcher to avoid situations where collected data does not the initial research intention (Yin, 2009).

Manstead and Semin (1988) point out that the strategies and tactics selected in carrying out a piece of research depend very much upon the type of research question(s) that are being answered, while Bryman and Teevan assert that 'research designs are broad structures that guide the execution of a specific research method and the analysis of the subsequent data' (Bryman & Teevan, 2005:25).

'A good research study design is one which has a clearly defined purpose, in which there is a coherence between the research questions and the methods or approaches proposed, and which generates data which is valid and reliable. It is also one which is realistic, conceived with due regard for both practical constraints of time and money and the reality of the research context and setting' (Lewis, 2003:47)

If the proposed research method and the sampling strategy are not compatible with the research questions, the research question should be reconsidered, or the proposed research methods matched up to the research questions. Robson promotes the importance of the link between the research question and the research design and states

that 'a good design framework will have high compatibility among purposes, theory, research questions, methods and sampling strategy' (Robson, 2002:82). Robson depicts a framework for research design thus:

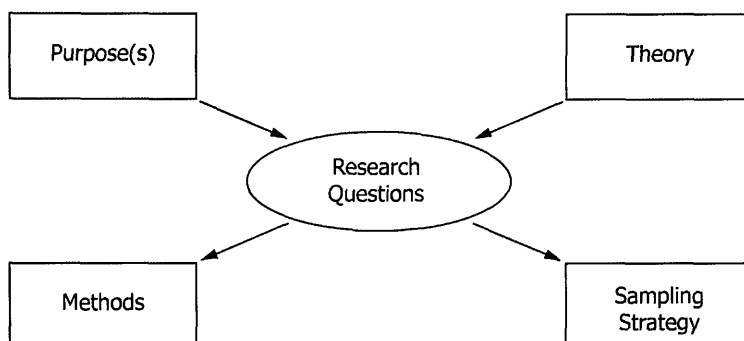


Fig. 3.6 Framework for research design (Robson, 2002)

Robson claims that providing the interactive nature of what goes on in a research project is understood, this framework 'has the advantage of presenting a simple and logical structure' (Robson, 2002:82). He raises a note of caution regarding the link between theory and research questions stating 'if your research questions do not link to theory it is unlikely that you will product answers of value' (Robson, 2002:82). In Robson's research design framework, the research questions are informed by both the purpose of the study and an understanding of the existing theory within the field, while the research methods and sampling strategy are informed by the research questions.

Research methods concern the techniques, which are available, and those which are actually employed upon a research project. Blaxter et al (2006) state that 'the term *method* can be understood to relate principally to the tools of data collection or analysis'. Research methodology refers to the principles and procedures of logical thought processes, which are applied to a scientific investigation (Fellows & Liu, 1997), while Blaxter et al (2006) add that 'methodology has a more philosophical meaning, and usually refers to the approach or paradigm that underpins the research'.

This section has discussed research design and its link to research questions, theory and research methods. The following section will consider research methods and their appropriateness to this study.

3.1.6 Research methods

Before discussing the proposed research methods for this study, it is appropriate to consider the range of methods available, their relative merits, and appropriateness for this study. Robson (2002) sees the choice of research methods or design as between fixed and flexible:

- *A fixed strategy* calls for tight pre-specification before you reach the main data collection stage where data is almost always in the form of numbers and as such type is often referred to as a quantitative strategy. If you can't pre-specify the design, don't use a fixed approach.
- *A flexible strategy* evolves during data collection. Data are typically non-numerical (usually in the form of words); hence this type is often referred to as a qualitative strategy. If you need flexibility within the research process, a flexible strategy is best.

Flexible designs can include the collection of quantitative data, but fixed design rarely include qualitative data (but could do) (Robson, 2002). Fixed design strategies include experiments and surveys which have clear and established standards for how they are carried out.

Experiments use logic and principles found in natural science research. Experiments can be conducted in laboratories or in real life contexts (Neuman, 2007). They usually involve a small number of people and address a well-focussed question. Experiments are most effective for exploratory research. Yin (2009) suggests that experiments are used when the form of research question is a *how* and *why* type, the timeframe is contemporary, and there is control over the behavioural events.

Survey techniques are often used in descriptive or exploratory research. A survey researcher asks people questions in a written questionnaire or during a structured interview and records answers (Neuman, 2007). Surveys work on the basis of statistical sampling often being achieved through structured interviews or questionnaires. Respondents simply answer questions and the researcher manipulates no situation or condition. In survey research, the researcher asks many people numerous questions in a short time period. Surveys give a picture of what many people think or report doing.

In flexible strategies, there are a wide range of different traditions. However three of these are prevalent in real world studies: case studies, ethnographic studies, and grounded theory studies (Robson, 2002).

Case studies involve the development of detailed, intensive knowledge about a single case or of a small number of related cases. The details of the research design usually emerge during the data collection and analysis (Robson, 2002). Typical features include study of the case in context; collection of data via a range of data collection techniques including observation, interview, and documentary analysis. Yin (2009) states that case studies are used for *how* and *why* type questions where the focus is on contemporary events but control over behavioural events is not possible or necessary.

Ethnographic studies seek to capture, interpret and explain how a group, organisation or community live, experience and make sense of their lives and their works (Robson,

2002). Ethnographic approaches typically answer questions about specific groups of people, or about specific aspects of the life of a particular group (Bentz & Shapiro, 1998). Typical features include immersion of the researcher in the research setting and use of participant observation.

Grounded theory studies aim to generate theory from data collected during the study. A grounded theory approach is particularly useful in new, applied areas where there is a lack of theory and concepts to describe and explain what is going on (Robson, 2002). Typical features include: application to a wide variety of phenomena, commonly interview-based, and a systematic but flexible research strategy which provides detailed prescriptions for data analysis and theory grounding.

One research method that can be both fixed or flexible is interviewing (Kvale, 1996). In quantitative approaches, interviews tend to be restricted to the form of structured interviews used in surveys although there are other applications. Interviews are well used in qualitative research and contribute to many research methods (Silverman, 2005 & 2006). Interviews are a powerful research method that enable researchers to develop an understanding of phenomena that cannot be understood by other means (Bryman & Teevan, 2005; Blaxter et al, 2006; Neuman, 2007). A well structured interview allows flexibility but can also controls the direction of the interview (Silverman, 2006). Many researchers have discussed the various types of interviews (Bryman, 2001; Blaxter et al, 2006; Neuman, 2007; Yin, 2009, Creswell, 2009) but Burns (2000) identified three main categories of interviews detailed below:

Structured interviews	Semi-structured interviews	Unstructured interviews
<ul style="list-style-type: none"> ▪ Standardised interviews ▪ Survey interviews ▪ Clinical history taking 	<ul style="list-style-type: none"> ▪ Survey interviews ▪ Group interviews ▪ In-depth interviews 	<ul style="list-style-type: none"> ▪ Oral or life history interviews ▪ In-depth interviews ▪ Group interviews ▪ Clinical interviews

Fig. 3.7 Three main categories of interviews (Burns, 2000)

- *Structured interviews* – structured or standardised interviews are used predominately in surveys and opinion pools with consequent quantitative analysis. Typical features include every interviewee receives the same questions in the same specified order; specific questions receive specific answers so that a conversational approach cannot be maintained; all or nearly all questions will be close-ended so a limited set of answers are available; and there is no flexibility or latitude allowed to either the interviewer or respondent. Disadvantages of structured interviews are that there is no chance for the interviewer to develop a rapport with the respondent; and there is no opportunity to find out the beliefs, feelings, or perceptions of the respondent.
- *Semi-structured interviews* – Rather than having a specific interview schedule or none at all, an interview guide is developed for the interview but without fixed wording or fixed ordering of the questions. A direction is given to the interview so

that the content focuses upon the critical issues of the study. There is more flexibility than in structured interviews. Typical features include: the informants perspective is provided rather than the perspective of the researchers being imposed; rapport is more likely as there is more time spent with the researcher; the informant uses language natural to them rather than trying to understand and fit into the concepts of the study. Disadvantages of semi-structured interviews include: the management of voluminous data collected, the resource required to undertake, transcribe, and analyse the interview and lack of scientific analysis procedures.

- *Unstructured interviews* - Unstructured or open-ended interviews take the form of a conversation between the interviewer and respondent and as such are less formal than other forms of interviews. A set of topics or issues may be covered but there is no set interview schedule or guide. Unstructured interviews allow the researcher to gain preliminary insight into the research subject to guide latter stages of the research. The free-flowing conversation relies heavily upon the quality of the social interaction between the interviewer and respondent. Unstructured interviews are used to obtain an individual's subjective life experiences when an oral life history is being elicited; it facilitates access to events and activities that cannot be directly observed by the researcher because perhaps they occurred in the past. A major disadvantage of unstructured interviews is that the researcher is open to the vagaries of the informants interpretation and presentation of reality; and the researcher is deprived of an ethnographic context in which the informants reported perceptions occur.

Interviews provide a powerful means to understand phenomena from a variety of perspectives. Further details of interviews methods are included in section 3.2. Data Collection. As we can see from, there are many research methods to explore and chose from. Biemans (1990) states:

'Different research methods can be used in addressing a specific research problem, the choice of methodology depends mainly upon the characteristics of the problem. Biemans (1990:28).

This study intends to understand the role of futures thinking within design. As such it will explore the phenomena by attempting to 'understanding how the world as seen by the views of the subjects of a study' (Miles & Hubberman, 1994). It will use a grounded theory approach that generates theory from data collected during the study.

Creswell (2009) states that 'after having decided upon a qualitative, quantitative, or mixed methods approach and after conducting a preliminary literature review and deciding a format for the proposal, the next step in the process is to design or plan the study'. As noted in 3.1.3, a qualitative research approach is advocated for this thesis as this is an enquiry process of understanding a human problem, namely the role of futures thinking in design.

There is no simple rule to guide the selection of research method.

'You can never empirically or logically determine the best approach. This can only be done reflectively by considering a situation to be studied and your own opinion of life. This also means that even if you believe that one approach is more or less interesting or rewarding than another, we ... do not want to rank one approach above another. In fact, on any general ground, the only thing that we can do is to try to make explicit the special characteristics on which the various approaches are based.' (Arbner & Bjerke, 1997:5)

Blaxter et al (2006) declare that 'there are many ways of thinking about, and categorising, the wide variety of methods available for designing, carrying out and analysing the results of research'. Different kinds of research approaches produce different kinds of knowledge about the phenomena under study. There are a variety of different research strategies to choose from. Yin (2009) concludes that every strategy can be used for exploratory, descriptive and explanatory purposes. Yin (2009) maintains that 'even though each method has its distinctive characteristics, there are large overlaps amongst them'.

3.1.7 Overview of research methods utilised

After assessing the range of research methods available to answer the research questions, the actual research methods to be employed within the research study were established. The various decisions relating to the identification of the exact methods employed have been contextualised within the theoretical research base (as detailed in sec.3.1). Fig.3.8 provides a detailed overview of empirical research and analysis process employed and aims to convey this in relation to the overall research process adopted for the study (see fig.3.1). The actual research process conducted is related to the theoretical base outlined in section 3.2 (Data Collection) and section 3.3 (Data Analysis). This provides an overview of what actual decisions were made and thus what research methods were employed.

3.1.8 Summary

The research questions for this study required that the research design included primary (empirical) and secondary data collection. This section has explored research methods discussing their relative merits in response to a specific research question. The use of a qualitative research approach, specifically a series of semi-structured interviews is advocated.

Methods for data collection and data analysis will now be considered separately in the following two main sections (sec.3.2: Data Collection and sec.3.3: Data Analysis). This intends to reflect the manner in which the research undertaken, the scheduling of associated activities, and the practical planning of research collection before data analysis can start.

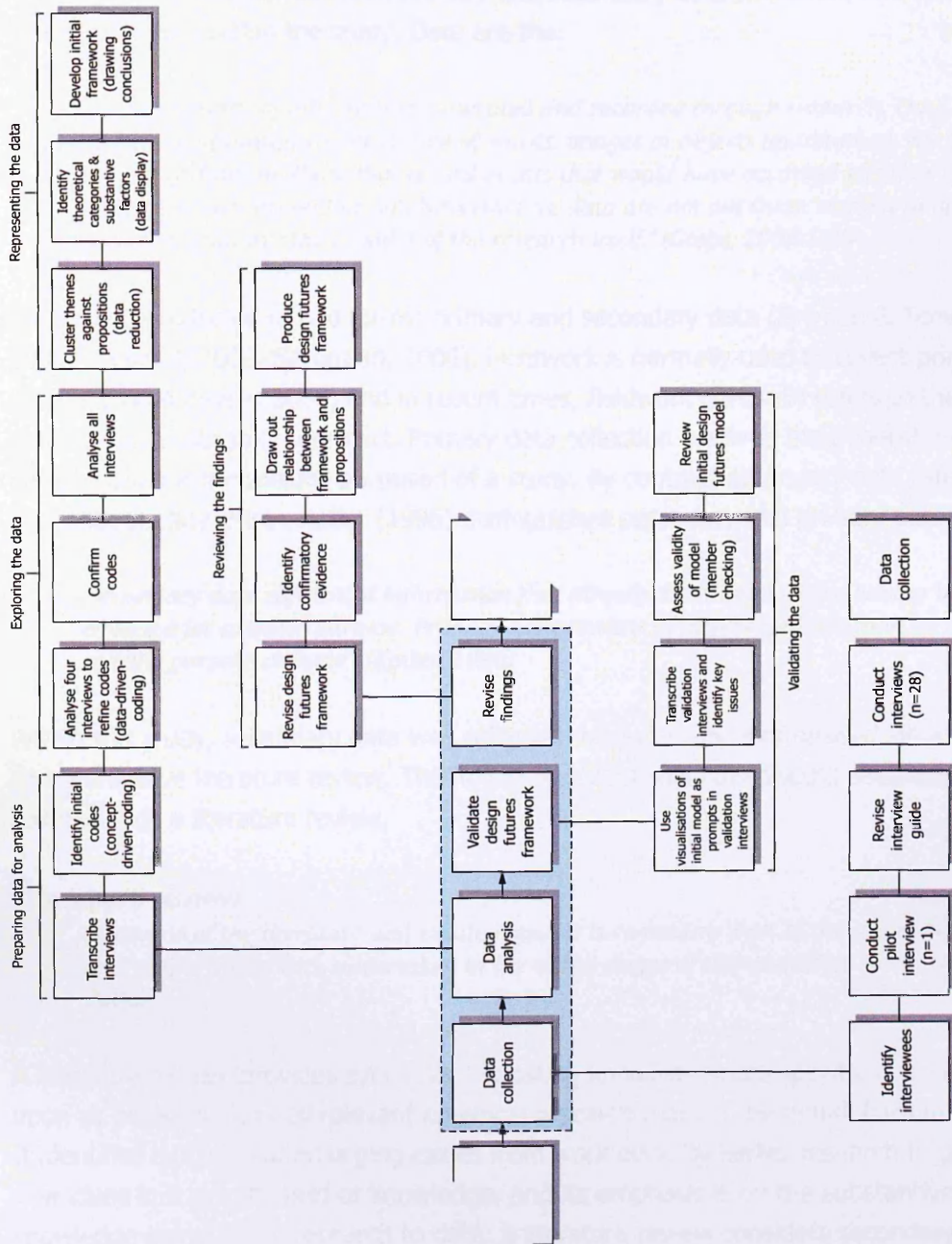


Fig. 3.8 Detailed overview of empirical research and analysis process.

3.2 Data Collection

The primary data collection method for this study is semi-structured interviews. Before considering this approach in detail, this section will consider data collection in a wider context, the differences between primary and secondary data collection, and the role of literature review within the study. Data are the:

'...items or units of information generated and recorded through research. Data can be numerical (quantitative) or consist of words, images or objects (qualitative). Naturally occurring data are those that record events that would have occurred whether a researcher was present or not. Nevertheless, data are not out there waiting to be collected. Data are the product of the research itself.' (Gibbs, 2007:148)

Data can be collected in two forms: primary and secondary data (Bryman & Teevan, 2005; Creswell, 2009, Silverman, 2006). Fieldwork is normally used to collect primary data (Payne & Payne, 2004) and in recent times, fieldwork generally refers to the primary data collection stage of a project. Primary data collection involved the generation of new data usually for the specific purpose of a study. By contrast secondary data refers to data that already exists. Kotler (1996) distinguishes secondary and primary data as:

'Secondary data consists of information that already exists somewhere having been collected for another purpose. Primary data consists of original information for the specific purpose at hand.' (Kotler, 1996)

Within this study, secondary data was collected, reviewed and synthesised via a comprehensive literature review. The following section will now discuss secondary data collection via a literature review.

3.2.1 Literature review

'A review of the literature and existing studies is commonly part of the ground-clearing and preparatory work undertaken in the initial stages of any empirical work.' (Hakim, 2000)

A literature review 'provides synthesis of existing knowledge on a specific question, based upon an assessment of all relevant empirical research that can be found' (Hakim, 2000). It identifies current and emerging issues from work done by earlier research to generate new ideas in a specific field of knowledge, and its emphasis is on the substantive knowledge gained from research to date. A literature review considers secondary rather than primary data sources.

Literature reviews can 'vary a great deal in emphasis, style and presentation' (Hakim, 2000). They can focus upon the contemporary situation or incorporate a historical analysis (Kessler-Harris, 1982). Lester (1983) states that they may seek to establish enduring patterns and relationships that are not specific to any specific period, while

Hakim (1999) identifies that they may seek to establish how cultural factors influence the research.

Neuman (2007) identifies the goals of a literature review are: (i) to demonstrate a familiarity with a body of knowledge and establish credibility, (ii) to show the path of prior research and how a current project is linked to it, (iii) to integrate and summarise what is known in an area, and to learn from others and stimulate new ideas.

Different types of literature reviews can to be distinguished. Dooley & Catalano (cited in Hakim, 2000) broadly identify two main types of literature reviews:

- Methodological research reviews which have a specific emphasis on assessing the contributions and weaknesses of different research.
- Policy-oriented research reviews summarise current knowledge with a view to drawing out the policy implications.

While Neuman (2007) provides a more nuanced identification of the types of literature reviews:

- Self-study increases the reader's confidence.
- Context reviews place a specific project in the big picture.
- Historical reviews trace the development of an issue over time.
- Theoretical reviews compare how different theories address an issue.
- Integrative reviews summarise what is known at a point in time.
- Methodological reviews point out methodology varies by study.

We can see that Dooley and Catalano, and Neuman have different perspectives upon the types of literature reviews. This thesis utilised what Dooley and Catalano term a methodological literature review, but is more akin to Neuman's integrative literature review although draws upon other of Neuman's classifications (such as the self-study, context, and historical reviews). Neuman (2007) acknowledges the interrelated nature of literature reviews and states that these are ideal types and a specific review often combines features of several kinds. This was the case in this study.

This study focuses upon literature from two fields:

- (i) literature from the field of future studies (the interdisciplinary field of social enquiry concerned with the study of yesterday's and today's changes with the intention of anticipating the future), and
- (ii) literature from the field of design (both theory and practice perspectives)

Literature was drawn from a wide variety of sources including books (of all kinds including sole-authored and edited volumes), journals (national and international;

research and practitioner-oriented), reports (produced by organisations and companies), popular media (newspapers, magazines, radio and television broadcasts), and computer-based materials (websites, discussion groups, blogs, etc). This list is in line with recommended literature sources identified by Blaxter et al (2006), Creswell (2009), and Neuman (2007) although some differences in language are evident.

Literature in the field was identified by the use of electronic databases, principally: (i) Salford University electronic library (via Athens), (ii) Lancaster University electronic library (MetaLib), (iii) Emerald, (iv) Ingenta Connect, (v) ScienceDirect, (vi) Proquest, (vii), Design Management Institute, (viii) the British Library's EThOS database (electronic theses online database), (ix) Google, and (x) Google Scholar. A series of keywords were used to search identify appropriate sources, and references from these sources were the used to locate other relevant information.

A systematic literature review (Neuman, 2007) was adopted whereby key aspects of literature were summarised and organised into a form that allowed access and cross-referencing. This was undertaken utilising a tabulated computer based approach where keywords, methodological aspects, alongside key contents were identified and input. This approach subsequently allowed easy retrieval and access to reviewed literature. The provenance of the literature, particularly when drawn from company reports and online sources was critically considered.

Black (2002) airs a note of caution regarding the evaluation of published research stating 'many reports will have faults, most will provide some valuable insights, but judging the validity of these will require knowing what to look for'. Hakim (2000) adds that the scope and depth of a study can be constrained by the availability of literature within a certain research focus. The literature provides what Creswell (2009) claims to be 'a broad explanation for behaviours and attitudes, that may be complete with variables, constructs, and hypotheses'.

The literature review presented a review of approaches to anticipating the future, how design engages with these approaches, and challenges to anticipating the future were discussed. The literature review undertaken for this thesis provided focus to the research by establishing the scope and nature of the field, underpinned the establishment of the research objectives, and enabled the development of the specific research questions.

This section has discussed the literature review as a secondary data collection mechanism. The following section will explore the role of interviews in primary data collections.

3.2.2 Interviews

Verbal data is the cornerstone of qualitative research (Flick, 2006). Interviews are the most common source of data in qualitative research (Bryman, 2001; Bryman & Teevan,

2005; Kvale, 1996; Gillham, 2005). Kvale (1996) describes the underlying driver for interviews as 'attempting to understand the world from the subjects' point of view, unfolding the meaning of peoples experiences, and uncovering their lived world prior to scientific explanations'. Gillham (2005) states that 'the strength of interview data is that they are often compelling', while Burns (2000) adds that the advantage of qualitative research interviews are 'that the informants perspectives are provided using language natural to them'. Interviews provide the researcher with a flexible instrument that is 'a very useful technique for collecting data which would likely not be accessible using techniques such as observations or questionnaires' (Blaxter et al, 2006). Silverman (2005) declares that 'I suspect that the choice of the interview as the gold standard of qualitative research is pretty well widespread'.

There are disadvantages to utilising interviews as a research tool, namely that the researcher requires listening skills and non-directive questioning techniques (Burns, 2000; Creswell, 2009), the interviewee may modify their behaviour so that it is not a true picture of the phenomena under consideration (Burns, 2000; Kvale, 1996), they are resource intensive – both in terms of the time to set up and conduct the interviews (Gillham, 2005; Neuman, 2007; Silverman, 2005) and in the analysis stage of the interviews (Neuman, 2007; Blaxter et al, 2006), and identification of appropriate subjects can be problematic (Bryman & Teevan, 2005; Flick, 2006).

Kvale (1995) contends that 'in an interview conversation, the researcher listens to what people tell them about their lived world, hears them express their views on their work situation and family life, their dreams and hopes'. Several types of interviews can be distinguished. The following summary is adapted from Flick (2006) and Bryman and Teevan (2005) and is by no means exhaustive:

- (i) The unstructured-interview: The researcher uses at most an aide memoire as a brief set of self-prompts to investigate certain topics. Unstructured interviews tend to be similar to a conversation and the interviewee is allowed to respond freely
- (ii) The semi-structured interview: The researcher has a list of questions or fairly specific topics to be covered, often referred to as an interview guide. By and large all of the questions are asked and a similar wording is used across all interviews.
- (iii) The focussed interview: The focussed utilises a uniform stimulus (a film, radio broadcast, etc.) and its impact upon the interviewee is studied. The following criteria are used within the interview: non-direction, specificity, range, and the depth and personal context shown by the interviewee.
- (iv) The problem-centered interview: By using a specifically designed interview guide incorporating questions and narrative stimuli, it is possible to collect biographical data with regard to a specific problem. The interview is characterised by three central criteria: problem centering, object orientation, and process orientation.
- (v) The expert interview: A special form of semi-structured interviews, the expert interview involves interviewees who are an expert in a certain field of activity. They

are integrated into a study not as a single case but representing a group. The range of potentially relevant information provided by the interviewee is restricted much more than in other interviews.

- (vi) The ethnographic interview: In the context of ethnographic field research, participant observation is mainly used. The local and temporal fieldwork is less clearly delimited than in other interview situations. Opportunities for ethnographic interviews often arise spontaneously and surprisingly from regular field contacts.
- (vii) The life history-interview: A special form of qualitative interview, the life history interview is often combined with analysis of various forms of personal documents like diaries, photographs, and letters, and it invited subjects to look back in detail across an entire life course and to report their experiences and how they understood the world. Its unambiguous focus upon the point of view of the life in question enables an understanding of how events unfolded and interrelate in people's lives.
- (viii) The narrative interview: Similar in form to the life history interview but more focussed, the narrative interview is mainly used in the context of biographical research. The informant is asked to present the history of an area of interest in which the interviewee participated in. The interviewer's task is to make the informant tell the story of the area of interest in question as a consistent story of all of the relevant events from beginning to end.

As can be seen above, there are many forms of interviews employed in qualitative research and decisions regarding what type of interview approach to adopt, and subsequently how to deploy the selected interview approach are complex and interdependent. Kvale (1996) puts forward that the questions of *what* and *why* the interviews are attempting to achieve have to be answered before the *how* can be addressed. In this study, interviews are the primary data collection tool to explore the role of futures thinking in design, and the justification for this research has been presented previously. This leads up to the *how* question as put forward by Kvale.

Commentators (Silverman, 2005; Kvale, 1996; Bryman & Teevan, 2005; Neuman, 2007 for example) discuss the multitude of approaches to the selection of research methods without total agreement. One central area of consensus is that the research methods should flow from the research questions while acknowledging the context of the research. The strategy for data collection was developed that sought to utilise a hybrid approach of drawing upon semi-structured and expert interviews. A series of semi-structured interviews with design industry professionals (hence the acknowledgement of *expert interviews* as contributing to the conceptual development of the research method) were confirmed as the primary data collection vehicle.

Semi-structured interviews involve the development of questions before the interview, but the interviews are undertaken in an open-ended format (Silverman, 2005; Kvale, 1996; Payne & Payne, 2004). All interviews are asked the same predetermined questions to ensure consistency and objectivity, but respondents are able to answer in any way the

feel appropriate (Creswell, 2009; Bryman & Teevan, 2005). The open-ended format enables the emergence of issues that the interviewer were not aware of (Flick, 2006) which Kvale (1996) describe as enabling spontaneous, rich, specific, and relevant answers from the interviewee to emerge. As this study involves in part an inductive approach, it is important to put in place research methods that enable new and unknown issues to emerge throughout the research process.

3.2.2.1 Reliability and validity

Reliability and validity are often difficult issues in a qualitative methodology as whilst the data presented may seem neat, tidy, and coherent, this is no guarantee that is a valid and a true reflection of a situation (Holloway, 2002). The use of interviews as the primary data collection methods needs to acknowledge the principles of reliability and validity (Neuman, 2007; Kvale, 1996; Flick, 2006) as reliability and validity are 'important in establishing truthfulness, credibility, or believability of findings' (Neuman, 2007).

Burns (2000) concisely describes reliability and validity thus 'reliability is concerned with the same result under the same conditions, while validity is concerned with an assessment or judgment measuring what it is supposed to measure'. Bryman and Teevan assert that in contrast to interviewing in quantitative research, where interviews are structured to maximise the reliability and validity of measurements of key concepts, interviewing within qualitative research 'is much less structured with an emphasis on openness and a greater freedom to add to initial research ideas once in the field' (Bryman & Teevan, 2005)

Neuman (2007) states that 'reliability means dependability or consistency' and suggests that the same thing is repeated or recurs under the identical or very similar conditions. Although qualitative researchers aim to be consistent over time in how they collect data, there is acknowledgement that they 'emphasise the value of a changing or developing interaction between the researchers and what he or she studies'. Neuman add that qualitative researchers:

'...see data collection as an interactive process in which particular researchers operate in an evolving setting and the setting's context dictates using a unique mix of measures that cannot be repeated' (Neuman, 2007:185)

The concept of reliability is challenging within qualitative research as there is a core acknowledgement within the field that there are inherent benefits to accepting and embracing diversity within the social world (Neuman, 2007).

Validity suggests truthfulness and refers 'to the bridge between a construct and the data' (Neuman, 2007). Qualitative researchers are more interested in authenticity than validity (Flick, 2006). Authenticity means giving 'a fair, honest, and balanced account of social life from the viewpoint of someone who lives it everyday' (Neuman, 2007). Qualitative

researchers have developed different approaches to validity to those of quantitative researchers.

'Qualitative researchers are less concerned with trying to match an abstract concept to empirical data and more concerned with giving a candid portrayal of social life that is true to the experiences of people being studied. Most qualitative researchers concentrate on ways to capture an inside view and provide a detailed account of how those being studied feel about and understand events' (Neuman, 2007: 185)

Qualitative researchers adhere to the core principle of validity - to be truthful, i.e. to avoid false or distorted accounts, and 'try to create a tight fit between their understanding, ideas, and statements about the social works and what is actually occurring in it' (Neuman, 2007). Verbatim transcripts, underpinned by interview notes, are employed to ensure validity in the data collection. Neuman (2007) points out that 'perfect reliability and validity are virtually impossible to achieve'.

Reliability is necessary for validity. Reliability is easier to achieve than validity. Although reliability is necessary in order to have a valid measure, it does not guarantee a measure will be valid. It is not a sufficient condition for validity. Reliability and validity are usually complementary concepts but these are dealt with differently between qualitative and quantitative researchers.

3.2.2.2 Preparing the interview guide - development of questions

In semi-structured interviews, an interview relates to a specific list of questions that all respondents are asked. Although the form of words may change slightly to reflect the interview context, essentially all respondents are asked the same questions (Kvale, 1996). Bryman and Teevan (2005) assert that 'What is crucial is that the actual questioning is flexible, allowing interviewers to learn how research participants view their social world'. Bryman and Teevan (2005:186) identify the basic elements in preparing an interview guide:

- Create a certain amount of order, so that questions flow reasonably well, but still allow changing the order during the actual interview
- Formulate interview questions or topics in a way that answers research questions (but do not make them too specific)
- Try to use language that is comprehensible and relevant to those being studied
- Not ask leading questions, just as in interviews in quantitative research, and
- Remember to record 'fact sheet' information of a general kind (name, age, gender, etc) and a specific kind (position in company, number of years employed, number of years involved in a group, etc), because such information is useful for putting people's answers in context

The interview guide for this study was developed in response to the research questions and research propositions. As was noted in the literature review, there is not a consistent

language used within design to describe the use of futures thinking in design. In fact the very term is hardly used at all. As noted by Bryman and Teevan (2005) it is important to 'use language that is comprehensible' so the term *futures studies* was not included within the interview questions. Rather, questions such as 'Is the future something that you think about when designing?' and latterly 'When designing, are designers within your organisation thinking of the 'now' or the 'future'?' were used as it was important to use language that the respondents were familiar with. Also, the need to ask non-leading questions was paramount.

A pilot interview was conducted to ensure the appropriateness of the interview guide as well as assessing the likely duration of interviews. The experience of undertaking this initial interview resulted in the refinement of the interview script. Some key outcomes of this pilot interview were: that the number of needed to be reduced (as the interview duration was 90 minutes), the language used could be simplified by removing any technical and/or specialised terms, the pace of the interview should be informed by the personality of the interviewee, and some interviewees were not able to provide meaningful answers to all questions (due to their knowledge, experience and awareness of the research issues).

3.2.2.3 Sampling and identification of interviewees

Adopting a reliable and valid strategy to select samples is a crucial factor in qualitative research. This study utilises two main strategies for sampling (or identification of interviewees) - theoretical sampling and snowball sampling. These two approaches are described by Burns (2000) as:

- In theoretical sampling, data collection is controlled by the developing theory. As information is gathered from the first few cases the underlying theory becomes extended, etc., and therefore informs the investigators as to which group(s) are relevant to interview.
- In snowball sampling, a person, who is identified as a valid member of a specified group to be interviewed, is asked to provide the names of others who fit the requirements. This is because in many situations the interviewer would not know the potential members of the sample.

Both of the above approaches require the initial identification of potential interviewees, or what some commentators term the chicken and egg syndrome. As noted in chapter 2, the proposed benefactors of this research will be design practitioners, design researchers, and organisations who undertake design. As the author has a background in design practice, a number of professional acquaintances were contacted and asked if they *were aware of any individuals, groups or organisations who were involved in next-next generation design projects?* This provided an initial list of potential research participants who were contacted to see if they were willing to discuss participation within the study. This was supported via evidence drawn from literature such as magazines, trade and

academic journals, and online resources such as websites, forums, and blogs. Bryman and Teevan (2005), Silverman (2005), Burns (2000), Gillham (2005), Creswell (2009) and Blaxter et al (2006) all note that research needs to be undertaken with acknowledgement to practical considerations to ensure that a feasible study can be achieved.

The theoretical sampling procedure informed the precise composition of the sample. Michlewski (2008) states that 'the logic behind this type of sampling prescribes to follow cases that are likely to replicate or extend the emergent theory or to fill theoretical categories'. The sampling approach adopted for this study is concerned with representatives, it seeks information richness and selects the cases purposefully rather than randomly (Michlewski, 2008; Gillham, 2000; Meyer, 2001).

In light of this underlying approach, organisations were chosen using a number of criteria (Michlewski, 2008): (i) their reputation among design professionals, (ii) the extent to which these companies have been studied and used as exemplars in relevant publications in the area of design, (iii) respectable industry positions and reputation, (iv) history of success as measured by design awards and business performance, and (v) my perception of these organisations within a design-led future context.

Prospective participants were normally contacted via email that outlined the overall aims of the study. In some instances, personal contacts within the design industry had recommended the participants and this information was included in the initial contact email. In some instances response emails and follow up emails were sufficient to arrange the interview schedule. In a small number of instances, follow up telephone calls were made to clarify pertinent issues. All interviews were undertaken face-to-face bar one which had to be rescheduled due to the participants work commitments. This interview was then undertaken as a telephone interview. Interviews were undertaken in the UK and USA. As an incentivisation strategy, all participants would be provided a copy of the final study. A full list of interviewees is provided in fig.3.9. (See appendix A.1 for the interview guide used with these participants)

Organisation	Employees	Sectors	Interviewee	Role	Date	Data used in meta analysis	Used in detailed analysis
Multidisciplinary design consultancy	90+	Retail, product, graphics, interior, multimedia, design strategy, design research	KS	Director of Strategy and Insight	04 April 2008	Yes	Yes
Small product design consultancy	5	Product (medical, FMCG, hi-tec, industrial)	MT	Director	25 April 2008	Yes	No
Medium-sized product design consultancy	20	Product (telecommunications, furniture, packaging, Office document solutions	TT	Senior Designer	29 April 2008	Yes	Yes
Global office solutions with in-house design capabilities	1000+	Office document solutions	WN	European Design Manager	13 May 2008	Yes	Yes
Small graphic design consultancy	8	Graphics, multimedia, branding	PB	Founding Director	13 May 2008	Yes	Yes
Product design consultancy	4	Product (consumer, medical, FMCG, industrial, packaging, high-tec, technical products)	AW	Design Director	18 May 2008	Yes	No
Medium-sized product design consultancy	12	Product (consumer, medical, FMCG, industrial, structural packaging, leisure)	SHL	Founder and Design Director	29 May 2008	Yes	Yes
Global Telecommunications organisation	1000+	Mobile telecommunications	GM	Head of Design Research	30 May 2008	Yes	Yes
Medium-sized product design consultancy	30	Product (consumer, medical, FMCG, industrial, packaging, leisure, high-tec, gaming)	IM	CEO	02 June 2008	Yes	Yes
Large global design consultancy *	500	Product (all major sectors); graphics, environmental design, service design, design research	JL	Project Leader	03 June 2008	Yes	Yes
Large global design consultancy *	500	Product (all major sectors); graphics, environmental design, service design, design research	JO	Project Leader	03 June 2008	Yes	Yes

Organisation	Employees	Sectors	Interviewee	Role	Date	Data used in meta analysis	Used in detailed analysis
Large global design consultancy *	500	Product (all major sectors); graphics, environmental design, service design, design research	MK	Project Leader	03 June 2008	Yes	Yes
Large global design consultancy *	500	Product (all major sectors); graphics, environmental design, service design, design research	TO	Senior Project Leader	03 June 2008	Yes	Yes
Large global design consultancy *	500	Product (all major sectors); graphics, environmental design, service design, design research	PR	Project Leader	04 June 2008	Yes	Yes
Sportswear design consultancy with off-shore manufacturing capabilities	20	Sportswear (rucksacks)	RS	Creative Director	14 June 2008	Yes	Yes
Large global design consultancy *	250	Product design, graphic design, interaction design, multimedia design, user experience design, interior design, design strategy	LW	Creative Director	20 June 2008	Yes	Yes
Small product design consultancy	2	Product (industrial equipment, telecommunications, FMCG, packaging, consumer)	MB	Founder and Director	25 June 2008	Yes	No
Baby equipment manufacturer with in-house design capabilities	50+	Baby equipment	Laura Slattery	Senior Designer	30 June 2008	Yes	No
Small product design consultancy	5	Product design, telecommunications, multimedia, design strategy	RE	Founder and Design Director	08 July 2008	Yes	Yes
Design academic – Professor of Forecasting and Innovation	1	Forecasting and Innovation	JW	Professor of Forecasting and Innovation	08 July 2008	Yes	No

Organisation	Employees	Sectors	Interviewee	Role	Date	Data used in meta analysis	Used in detailed analysis
Qualitative research consultancy	50+	Qualitative research agency specialising in consumer research	RH		08 July 2008	Yes	Yes
Large branding and advertising agency	100+	Branding, brand development, FMCG, corporate identity, advertising design	LH	Senior Planner	09 July 2008	Yes	Yes
Interactive design and social media development agency	5	On-line digital service provider	MJ	Founder and Creative Director	09 July 2008	Yes	No
Innovation and product design consultancy	65	Product (electronic goods, transport, consumer products, technical, medical), packaging, home wares, FMCG trends research, innovation research, design research	SR	Director of Foresight	08 July 2008	Yes	Yes
Retail design consultancy with manufacturing capability.	30	Retail design, pos, pop, packaging, display	LT	Senior Designer	09 July 2008	Yes	No
Global Telecommunications organisation	1000+	Mobile telecommunications, AV, white goods,	AR	Head of Trends and Research	29 July 2008	Yes	Yes
Innovation and product design consultancy	50	Product (electronic goods, high-tec, home wares, consumer products, technical, medical), strategy, trends research, packaging, FMCG, innovation management, design research, prototyping and testing	SB	Director of Research and Insight	29 July 2008	Yes	Yes

Fig. 3.9 Interview participants

This section has discussed the role of, and approach to, primary data collection of interviews. This study will utilise semi-structured interviews as its primary data collection mechanism.

3.3 Data Analysis

'Analysis is a challenging and exciting stage of the qualitative research process. It requires a mix of creativity and systematic searching, a blend of inspiration and diligent detection. And although there will be a stage dedicated to analysis, the pathways to forming ideas to pursue, phenomena to capture, theories to test begins right at the start of the study and ends while writing up the results. It is an inherent and ongoing part of qualitative research.' (Spencer et al, 2003)

Data collected in this study was in the form of verbatim transcriptions of a series of semi-structured interviews. Due to its reliance upon textual material, qualitative research approaches rapidly generate a large amount of data (Bryman & Teevan, 2005). Miles (1979) describes qualitative data as an 'attractive nuisance' – attractive because of its richness but also a nuisance because that very richness can lead to a failure to examine the data in their wider significance.

Gibbs contends that

'...a lot of qualitative research explicitly tries to generate new theory and new explanations. In that sense the underlying logic is inductive. Rather than starting with some theories and concepts that are to be tested or examined, such research favours an approach in which they are developed in tandem with data collection on order to product and justify generalisations and thus create new knowledge and understanding' (Gibbs, 2007:5)

The purpose of data analysis is to find meaning in the data that has been collected. Data analysis is undertaken by systematically arranging and presenting the information that has been collected (Burns, 2000). Blaxter et al (2006) declare that 'data in their raw state do not constitute the findings of your research'. The data needs to be transformed from this raw state into meaningful insights. Gibbs (2007) asserts that 'the idea of analysis implies some kind of transformation'. The transformation 'starts with collection of often voluminous qualitative data which is then processed, through analytic procedures, into a clear, understandable, insightful, trustworthy and even original analysis' (Gibbs, 2007). Most writers about qualitative data analysis recognise that it involves two aspects (Coffey & Atkinson, 1996; Mason, 2002; Flick, 2006) – firstly sorting, retrieving, indexing and handling of qualitative data (Miles & Hubberman, 1994; Maykyt & Morehouse, 2001; Richie & Lewis, 2003); and secondly involving interpretation and retelling that is imaginative and speculative (Mischler, 1986; Riessman, 1993; Denzin, 1997; Giorgi & Giorgi, 2003).

Some commentators claim that analysis is an ongoing process which might occur throughout the research (Blaxter et al, 2006; Miles & Hubberman, 1994) and the stages

and processes involved do not simply follow one after another (Bryman & Teevan, 2005). This process is often iterative, meaning that analysis starts after some of the data has been collected and then implications of that analysis shape any further data collection (Bryman & Teevan, 2005).

A number of structural approaches to qualitative data analysis have been developed but it is acknowledged that qualitative data analysis is normally less structured than quantitative data analysis (Bryman & Teevan, 2005; Silverman, 2006 & 2006). As Robson (2002) notes, 'there is no clear and accepted single set of conventions for analysis corresponding with those observed in quantitative data'. Creswell and Clark (2007) identify general procedures in qualitative data analysis and present them within the following framework:

General procedures in data analysis	Qualitative procedures
Preparing the data for analysis	<ul style="list-style-type: none"> ▪ Organising documents and visualising data ▪ Transcribing text ▪ Preparing the data for analysis
Exploring the data	<ul style="list-style-type: none"> ▪ Reading through the data ▪ Writing memos ▪ Developing qualitative codebook
Analysing the data	<ul style="list-style-type: none"> ▪ Coding the data ▪ Assigning labels to codes ▪ Grouping codes into themes (or categories) ▪ Interrelating themes (or categories) or abstracting to smaller set of themes
Representing the data analysis	<ul style="list-style-type: none"> ▪ Representing findings in discussion of themes or categories ▪ Presenting visual models, figures, tables
Validating the data	<ul style="list-style-type: none"> ▪ Using researcher, participant, and reviewer standards ▪ Employing validation strategies (e.g. member checking, triangulation, peer review)

Fig. 3.10 Procedures in qualitative data analysis (adapted from Creswell & Clark, 2007)

This chapter will utilise Creswell & Clark’s framework to discuss the data analysis employed in this study although the author acknowledges that other frameworks have been developed to describe the process of qualitative data analysis (for example Spencer’s et al (2003) Qualitative Data Analytic Hierarchy; Miles and Hubberman’s (1994) General Framework for Conceptualising Qualitative Data Analysis; and Bryman and Teevan’s (2005) Processes and Outcomes in Grounded Theory although many more exist).

3.3.1 Preparing the data for analysis

At the start of the analysis process, the researcher is faced by a mass of unwieldy, tangled data and so the first task is to sort, organise and reduce the data to something more manageable (Spencer et al, 2003). Miles and Hubberman (1994) identify a number

of suggestions that assist in the organisation and reduction of data but emphasise that this is part of the analysis and not a separate activity. Their suggestions include:

- Session summary sheets – after a data collection activity has taken place, an interview for example, a single sheet should be prepared which summarises what has been obtained, who was involved, what issues were covered, relevant to research questions, etc.
- Document sheet – a single sheet should be prepared for each document collected which clarifies the context and significance, as well as summarising the content of lengthy documents.

The session summary and document summary sheets assist in the data reduction, which is viewed as part of the analysis process (Robson, 2002).

Creation of accurate transcriptions of interviews is an important part of qualitative data analysis (Miles & Hubberman, 1994; Creswell, 2009; Gibbs, 2007; Blaxter et al, 2006; Silverman, 2006). All interviews in this study were audio recorded and subsequently transcribed. Silverman (2005) contends that there is a strong inductive bent to the creation of transcripts from audio recordings that Heritage (1984) describes as 'analysis is strongly data-driven – developed from phenomena which are in various ways evidenced in the data of interaction'.

Different transcription systems are available which vary in the degree of exactness (see Kowall & O'Connell (2004) for a detailed overview) although a standard has not yet been established (Flick, 2006). Flick (2006) notes caution with regard to exactness in transcription notation asserting that 'the formulation of rules for transcription may tempt one into some kind of fetishism that no longer has a reasonable relation to the question and the product of the research'. Exacting standards in transcription notation are only justified in exceptional cases. Interviews were transcribed verbatim but Jefferson's transcribing conventions (see Rapley (2007) for a description), which involve the use of specific series of notation devices to transmit the various interactional features of conversation, were not employed. Jefferson-style transcripts can appear to be overly technical and complex way of reproducing talk and it is often hard to make sense of the text and imagine what the talk sounded like (Rapley, 2007). Interactional features like laughter, long pauses, a questioning tone, and emphasis were included within transcriptions. Utterances such as *um*, *yeah*, and *you know*, were only included when they contributed to the narrative of the interview. Grammatical accuracy was the intention wherever possible. Upon completion, transcriptions were checked once again against the audio recordings for accuracy.

Although interviews were recorded (and subsequently transcribed verbatim), interview field notes were taken during (and normally added to directly after the interview) to take note not just of what the respondent was saying, but what they were doing. As noted by

a number of researchers (Creswell, 2009; Burns, 2000; Bryman & Teevan, 2005 for example) such things as body language can indicate that the interviewee is becoming uneasy with a line of questioning, for example.

3.3.2 Exploring the data

Rapley (2007) states that transcriptions by their very nature are *translations* and are always partial and selective textual representations, adding that 'what is key to remember is that you base your analysis upon the recordings and field notes and not just upon the transcription'. Reading through the data, taking notes and developing an affinity with the data is an essential part of the analysis process. The actual process of making detailed transcripts enables a familiarity with the data to develop.

Reading through and exploring the data is noted by Miles and Hubberman (1994) as essential to the analysis process as it underpins the development of insight within the data. There is some diversity within literature as to how this process of exploring the data might occur. Grbich (2007) maintains that 'each researcher must decide what works for them' as no one single approach is prevalent. Dey (1993) identifies early interactive reading of data segments as: free association, that is writing freely regarding the data; comparing interviews with own experiences; shifting focus amongst the levels of data to highlight other areas; reading data in different sequences; critiquing the data by asking 'who?', 'what?', 'why?', 'when?', 'so what?'; and transposing the data by asking 'what if?'

Creswell and Clark (2007) claim that exploring the data involves (a) examining the data with an eye to developing broad trends and (b) reading through the data, making memos, and developing a preliminary understanding of the categories contained within the data. Reading through the data results in the recording of initial thoughts by writing short memos directly within the interview transcripts, typically within the margins (Creswell & Clark, 2007). Robson (2002) describes memos more broadly as 'anything that occurs to you during the project and its analysis'. He adds that 'memos are simply attempts either to link data together or to suggest that a particular piece of data falls within a more general category'. Memoing is a useful means of capturing ideas, views and intuitions at all stages of the data analysis process. Memos can be applied not only to interview transcripts but also other forms of data such as observational field notes, and session summary and document summary sheets.

'Making these memos becomes an important first step in forming broader categories of information, such as codes or themes. ... At this time as well, a qualitative codebook can be developed. The codebook is a statement of the codes for the database. It is generated during a project and may rely upon codes from past literature, as well as codes that emerge during an analysis. The process of generating this codebook helps organise the data, and it facilitates agreement on the contents of the transcripts as new codes are added and other codes removed during the coding process'. (Creswell & Clark, 2007:131)

Not all qualitative researchers utilise a codebook as systematically as described but this approach help to organise large datasets.

Gibbs (2007) denotes the construction of codes in a codebook as an analytic process and 'the building up of a conceptual schema'. It is possible to construct a codebook without initial reference to the data collected. Gibbs (2007) identified two opposing approaches to the development of codes:

- *Concept-driven coding* – the categories or ideas the codes represent may come from the research literature, previous studies, topics in the interview schedule, hunches you have about what's going on, etc. (Gibbs, 2007). It is possible to construct a collection of codes in a codebook without, at first using them to code the data (Richie et al., 2003). In concept driven coding, *codes do not come from the data*. Authors (Richie et al., 2003; King, 1998; Gibbs, 2007) recognise that there is a need to amend the list of codes during analysis as new ideas and new ways of categorising the text emerge.
- *Data-driven coding* – the opposite of starting with a list of codes *is to start with none* (Gibbs, 2007). This is usually called open coding where the researcher needs to try to start with no preconceptions, but this is hard as we all have ideas of what we might expect to be happening. This approach is taken by advocates of grounded theory (Glaser & Strauss, 1967; Straus, 1987) where researchers start by reading the text and start to tease out what is happening and do not impose an interpretation based upon pre-existing theory. There is recognition that a complete *tabula rasa* approach is unrealistic

The two approaches of generating codes are not exclusive (Gibbs, 2007) and most researchers move backwards and forwards between both sources of inspiration during their analysis. The possibility of constructing codes before or separately from an examination of the data will reflect, to some extent, the inclination, knowledge and theoretical sophistication of the researcher.

3.3.3 Analysing the data

Qualitative data rapidly cumulates, and even with regular processing and summarising, it is easy to get overwhelmed (Grbich, 2007; Robson, 2002; Silverman, 2005, Bryman & Teevan, 2005; Flick, 2005; Rapley, 2007). The material is unstructured and difficult to deal with. Robson (2002) claims that coding provides a solution where 'a code is a symbol applied to a section of text to classify or categorise it'. Miles and Hubberman (1994) denote codes as 'tags or labels for assigning units of meaning to the descriptive or inferential information compiled during a study', while Gibbs (2007) claims that codes are 'a term that represents an idea, theme, theory, dimension, or characteristic of the data'. Codes are 'retrieval and organising devices that allow you to find and then collect together all instances of a particular kind' (Robson, 2002). Codes are typically related to research questions, concepts and themes.

Codes are usually attached to 'chunks' of varying size – words, phrases, sentences, or whole paragraphs, connected or unconnected to a specific setting (Miles & Hubberman,

1994). Gibbs (2007) details coding as 'how you define what the data you're analysing are about. It involves identifying and recording one or more passages of text that, in some sense, exemplify the same theoretical or descriptive idea'. Böhm (2004) claims that 'coding may be described as the deciphering or interpretation of data that includes the naming of concepts and also explaining and discussing them in more detail'. In the data, indicators are sought of the phenomenon being studied, and the target of the first analysis is the production of codes that relate *directly* to the data. Initially, concepts always have a provisional character, and in the course of the analysis they become more differentiated, numerous and abstract. The differentiated concepts are known as categories (Böhm, 2004).

Codes can come 'from the exact words of the participants (*in vivo* coding), a term composed by the researcher, or a concept in the social or human sciences' (Creswell & Clark, 2007).

Three types of coding are distinguished (Strauss, 1987) which underpin a grounded theory approach (Gibbs, 2007). Grounded theory is an inductive form of qualitative research (Glaser & Strauss, 1967) where data collection and analysis are conducted together. 'Constant comparison and theoretical sampling are used to support the systematic discovery of theory from the data. Thus theories remain grounded in the observations rather than generated in the abstract. Sampling of cases, settings or respondents is guided by the need to test the limits of developing explanations, which are constantly grounded in the data being analysed' (Gibbs, 2007). The three types of coding are described below:

- *Open coding* - where the text is read reflectively to identify relevant categories (Strauss & Corbin, 1990). Open coding is performed during a first pass through recently collected data (Neuman, 2007). In open coding data are broken down analytically. From the data, that is from the text, a succession of concepts are developed that may ultimately be used as building blocks for a model (Böhm, 2004). The researcher locates themes and assigns initial codes or labels in a first attempt to condense the mass of data into categories (Neuman, 2007). New themes can be created and existing codes can be changed in subsequent analysis. Open coding brings themes to the surface from deep inside the data (Gibbs, 2007). The themes are at a low level of abstraction and come from the researchers initial research question(s), concepts in the literature, terms used by members in the social setting, or new thoughts stimulated by immersion in the data (Neuman, 2007). Open coding is the first stage of coding in grounded theory (Gibbs, 2007).
- *Axial coding* – in axial coding the relationships of categories are explored and connections between them are made (Gibbs, 2007). The researcher begins to select codes that represent and highlight the core issues of themes in the data. Categories are refined, developed and related or interconnected (Glaser & Strauss, 1967). This step serves to refine and differentiate concepts that are already

available and lends them the status of categories (Böhm, 2004). The researcher begins with an organised set of initial codes or preliminary concepts and focuses upon the initial coded themes more than the data (Neuman, 2007). One category is located at the centre and a network of relationships is developed around it. The movement is towards organising ideas or themes, and identifies the axis of key concepts in analysis (Miles & Hubberman, 1994). During axial coding, the researcher 'asks about causes and consequences, conditions and interactions, strategies and processes, and looks for categories or concepts that cluster together' (Neuman, 2007). Axial coding is the second stage of coding in grounded theory (Gibbs, 2007).

- *Selective coding* – in selective coding a central phenomenon or core category is identified and all other categories are related to it (Gibbs, 2007). Selective coding involves scanning data and previous codes. The main phenomenon is described as the core category (Böhm, 2004) and is already present in the formulation of the research question of the particular study. 'Researchers look selectively for cases that illustrate themes and make comparisons and contrasts after most or all data collection is complete' (Neuman, 2007). In this phase 'the researcher is particularly active as an author on the bases of the categories, coding notes, memos, networks and diagrams so far developed' (Böhm, 2004). During selective coding, researchers begin to have well-developed concepts and have started to organise their overall analysis around several core generalisations (Neuman, 2007). During selective coding, major themes or concepts ultimately guide the researchers search, reorganising specific themes identified in earlier coding and elaborates more than one major theme. If a number of well-worked-out axial categories are available we may assume that the central phenomenon has been captured in its essential aspects – otherwise it is necessary to return to earlier phases in the research (Böhm, 2004). Selective coding is the final stage of coding in grounded theory (Gibbs, 2007).

Within this study, open, axial and selective coding was applied during the data analysis activities. The use of visual maps to develop themes were employed, namely the use of post-it notes to capture codes (and subsequently themes) coming out of the data and explore various patterns and correlations. The use of post-it notes provided a high level of flexibility and allowed quick and easy manipulation of the data. Relationships could be tested, changed, revised, and renewed with ease. Photographs were employed as a data recording mechanism such that possible avenues could be captured easily by taking a high-resolution image of work in progress. This meant that the research was not being stifled or slowed down with having to input data into the computer and save multiple versions. Once a photograph was taken, it was easy to continue to explore a variety of possible correlations or conceptual approaches. Photographs were recorded in sequential order ensuring that date, time, and associated thinking was duly noted. Printouts were regularly used as a mechanism to 'work into the data' by undertaking notation and making notes, comments and explorations directly onto the printouts. Banks (2007)

declares that 'it is difficult to imagine a social research investigation that does not – or that could not – employ images at some stage of the analysis'. As the author is a trained designer, the use of visual mechanisms to underpin the research and analysis activity is both comfortable and draws upon strength in visual awareness.



Fig. 3.11 An example of the visual maps used in the data analysis

As well as being recorded upon post-it notes, codes, concepts, themes and categories were also captured digitally and input into word processing software for analysis. The development of codes, concepts, themes and categories was, as noted by (Bryman & Teevan, 2005), iterative and involved moving back and forth between the data, analysis, development of codes, concepts, themes and categories, and visualisations of the interrelations of the data. As this process progressed, well-developed concepts were being organised and the overall analysis was forming around several core generalisations. Creswell and Clark (2007) detail this process as 'evidence from a database is grouped into increasingly broader perspectives. Themes then can be grouped into even larger dimensions or perspectives, related, or compared'. Themes can be related and form themes, often termed categories, which can, where appropriate, related them in a theoretical or conceptual model (Creswell & Clark, 2007). In this process, the themes, interrelated themes, or larger perspectives are abstracted and form the findings or results that provide answers to the research questions.

The transcripts of 28 interviews were analysed to identify and develop codes for the codebook and latterly to identify concepts, themes and categories. This meta-analysis process helped to draw out interrelated themes, or larger perspectives, that were used to undertake a detailed analysis of selected interviews. After this initial analysis, 20 interviews were selected for detailed analysis. The reasons for this were that some interviews covered similar ground and thus did not add any additional data, some interviews provided tangential or irrelevant data (primarily due to limited knowledge,

experience and awareness of the research issues), some interviewees were unable to verbalise tacit understanding of design-led futures, and the breadth of sectors that the interviewees operated in provided data that could support generalizable findings. After an initial meta-analysis stage involving all 28 interviews, the relevance, breadth and significance of responses in relation to the research questions informed the selection of 20 interviews that were subjected to a rigorous and detailed analysis as outlined above. A combination of concept-driven and data-driven coding was used to identify and develop codes, concepts, themes, and categories.

Due to the size of the dataset - over 155,000 words for the 20 interviews utilised for the detailed data analysis - the analysis was undertaken utilising a framework drawn from the research questions and propositions. The propositions provided an underlying framework that the key concepts, themes and categories were mapped against. Codes were assigned to identify data that did or did not correlate with the research propositions. After the relevant data was categorised against the research propositions, this data was subjected to further analysis. This approach is termed *conceptualisation* by Neuman (2007) where the researcher 'develops new concepts, formulated conceptual definitions, and examines the relationship among concepts'. This approach concentrates on eliciting meaning from empirical data (Guba & Lincoln, 1994). The idea here was to reduce the redundancy of concepts and create robust categories (Michlewski, 2008).

3.3.4 Representing the data analysis

The next stage in the analysis process is to represent the results of the analysis in summary form (Creswell & Clark, 2007). Drawing upon a data analysis approach for interview transcripts employed by Michlewski (2008), the results of the analysis process are represented in the form of descriptive categories that have been related to each other by abstract concepts. For the purposes of this work, the descriptive categories are termed *substantive factors* as they were drawn from substantive instances within the interview data. These substantive factors are abstracted to provide abstract concepts that were termed *theoretical categories*. This process was repeated for each of the research propositions.

The data analysis was presented utilising tables that denoted empirically derived categories representing the role of futures thinking within design within the framework of six research propositions. Michlewski (2008) explains that 'the core categories are primarily identified following the comparison of existing concepts to other concepts and incidents that emerged from the analysis of transcripts'.

Once again, visual mapping was used to cluster information and identify patterns ensure that the researcher was able to develop a deep understanding of the data which was combined with reading, reflecting, linking, noting, and doodling (Bazeley, 2007). The use of visual mapping approaches assists in the identification of connections and patterns

(Gibbs, 2007) and as such provided a mechanism to translate coded data into concepts, themes, and categories which could then be disused in detail.

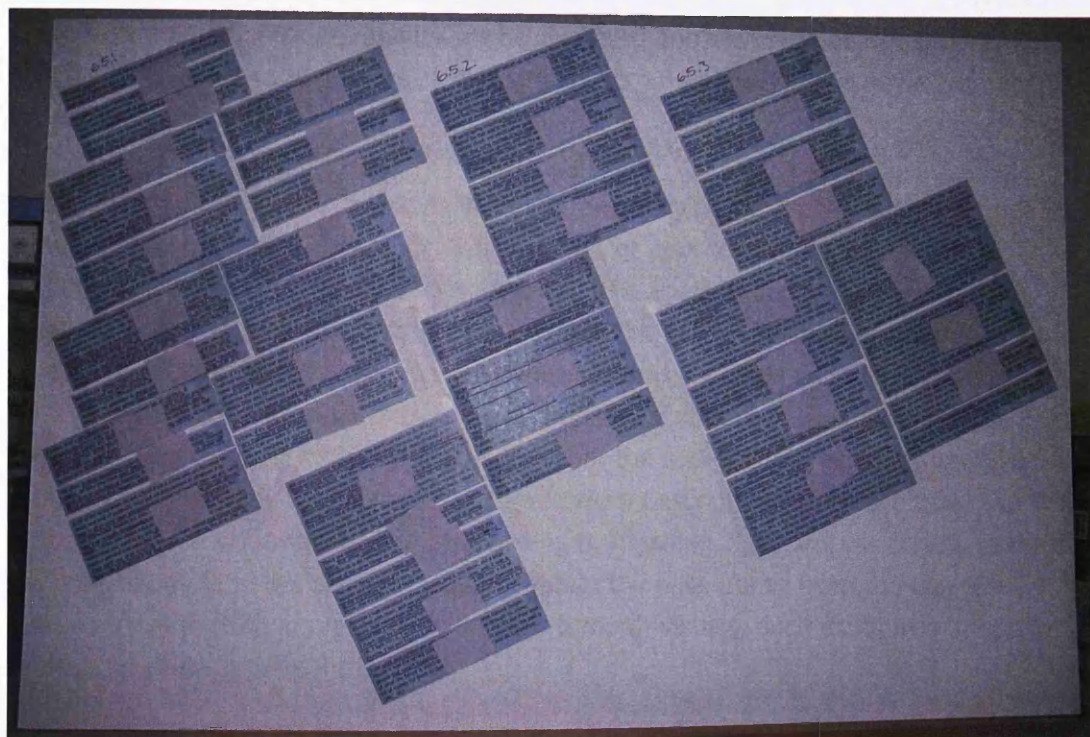


Fig. 3.12 An example of the visual mapping was used to cluster information and identify patterns against propositions.

Miles and Hubberman (1994) identify three activities within qualitative data analysis:

1. *Data reduction* – selecting, focussing, simplifying, abstracting, and transforming
2. *Data display* – organised compressed assembly of information that permits conclusion drawing
3. *Drawing conclusions* – deciding what things mean, noting regularities, patterns, explanations, possible configurations

This stage of the analysis was focussed upon stage two of their approach, i.e. data display. Data display refers to the 'visual format that presents information systematically, so the user can draw valid conclusions and take needed action'. They add that 'valid analysis requires, and is driven by, displays that are focussed enough to permit a viewing of a full data set in the same location, and are arranged systematically to answer the research questions at hand' (Miles & Hubberman, 1994). Creswell and Clark (2007) affirm that 'presenting the results may involve a discussion of the evidence for the themes or categories; the presentation of figures that depict the physical setting of the study; of frameworks, models, or theories. When discussing the evidence for a theme of category, the basic idea is to build a discussion that convinces the reader that the theme or category emerges from the data'. Within this study, the discussion of the evidence for a theme or category was supported with direct quotations from the transcriptions which

were contextualised within relevant literature. These generalisations which drew upon consistencies in data were related to the formalised body of knowledge from the literature (Robson, 2002; Silverman, 2005; Bryman & Teevan, 2005; Gibbs, 2007). In some instances, counter arguments were introduced and identified as not supporting the propositions, thus providing multiple perspectives from individuals to show divergent views (Creswell, 2005).

Writing strategies for providing evidence include conveying subthemes or sub categories, citing specific quotes, and using different sources of data to cite multiple items of evidence (Creswell & Clark, 2007). As identified, the analysis utilised the research positions as a framework to cast the data within. The use of descriptive categories or *substantive factors*, which were clustered into patterns that formed abstract concepts that were termed *theoretical categories*, was applied throughout the data analysis. This provided an underlying form that assisted in both the analysis and its communication. As the data analysis activity progresses, it moved from descriptive to interpretative - or what Gibbs (2007) describes as moving from saying to meaning. This process begins to draw generalisations from the specific instances within the data. Apart from the use of discussions, the study represents its findings through visuals, such as figures, maps, or tables that present different themes.

A model of the role of futures thinking in design was developed and refined at the final stages of the data analysis. This provided an overview of the key findings identified within the data analysis. Robson (2002) states that it is important that findings were contextualised within the formalised body of knowledge and as such the data analysis was clearly related to literature and discussed within the themes and categories. This stage of the analysis began to move into what Miles and Hubberman (1994) term 'drawing conclusions'. This was an iterative process that once again involved visualisation and movement back and forth to the data. An example of the iterative visualisations used to develop the conceptual model of futures thinking within design is indicated in Figure. 3.13.

Blaxter et al (2006) see this stage as developing explanations and understanding. Explanations which seek to make something intelligible (about why things are the way they are), and understanding the perception of the meaning of something (related to the research questions of the study). Miles and Hubberman (1994) identify a number of tactics of generating meaning out of the data under consideration. They advise that not all of these tactics are appropriate to every study, researcher, or available resource.

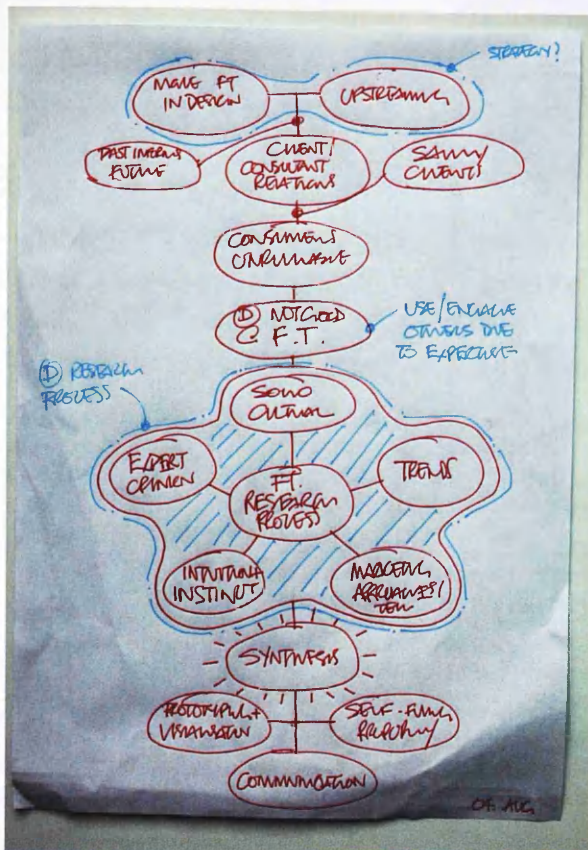


Fig. 3.13 An example of the iterative visualisations used to develop the conceptual model of futures thinking within design.

Some of the tactics for generating meaning (Miles & Hubberman, 1994) that were employed in this study to underpin the development of the conceptual model of the role futures thinking in design include:

- *Noting patterns, themes and trends*
- *Seeing plausibility* – do the trends, patterns and conclusions make sense?
- *Clustering* – grouping events, places, people, processes etc. together if they have similar characteristics
- *Making contrasts and comparisons* – establishing similarities and differences between and within the data sets
- *Subsuming particulars into the general* – linking specific data to general concepts and categories
- *Factoring* – attempting to discover the factors underlying the process under investigation
- *Building a logical chain of evidence* – trying to understand trends and patterns through developing logical relationships
- *Making conceptual/theoretical coherence* – moving from data to constructs to theories through analysis and categorisation.

The conceptual model of the role of futures thinking in design comprised of a series of key factors that were drawn from the empirical data and were contextualised within the formalised body of knowledge in the literature.

3.3.5 Validating the data

Reporting the validity of the data and results is a key component of all good research and serves the purpose of checking on the quality of the data and the results (Creswell & Clark, 2007). Robson (2002, based upon Miles and Hubberman, 1994) identifies a series of related tactics for testing and confirming findings:

Assessing data quality	<i>Checking for representativeness</i> – pitfalls to gathering representative data include the informants, and the events or activities sampled. Safeguards include use of random sampling; triangulation; constructing data displays; and seeking data for weakly sampled cells.
	<i>Checking for researchers effects</i> – these can be the effects the researcher has on the case, or the effects the involvement in the case has on the researcher.
	<i>Triangulation</i> – the use multiple methods within the same study to view a phenomena from a number of viewpoints. Sometimes termed getting a fix on something from two (or more) places.
	<i>Weighting the evidence</i> – some data are stronger than others and you naturally place a greater reliance on conclusion based upon the former. Stronger data are those that typically you collect first-hand; from repeated contact; or which you have observed yourself.
Testing patterns	<i>Checking the meaning of outliers</i> – there are exceptions, the ones that don't fit into the overall pattern of findings or lie at the extremes of a distribution. Don't be tempted to hide or forget them.
	<i>Using extreme cases</i> – there are outliers of a particular type, defined in terms of being atypical situations or persons rather than by the data they provide, which may or may not be atypical.
	<i>Following up surprises</i> – you may well be surprised because something is at variance with your theory of what is going on. This then provides the opportunity to bring the theory to the surface, possibly to revise it, and to search for evidence relevant to the revision.
	<i>Looking for negative evidence</i> – the tactic of actively seeking disconfirmation of what you think is true. While this is in principle straightforward, you are likely to have some reluctance to spending a large amount of effort upon this activity.
Testing explanations	<i>Making if-then tests</i> – testing possible relationships: i.e. if one condition obtains or is the case, look to see if a second one is. If it is, you are on the way to understanding what is going on and can make further similar tests. If it isn't true, you have to make other conjectures.
	<i>Ruling out spurious relationships</i> – if you appear to have established a relationship, consider whether there may be a third factor or variable which underlies, influences or causes the apparent relationship.
	<i>Replicating a finding</i> - if a finding can be repeated in a different context or data set, then it is dependable. Given that once you find a relationship or develop a theory there is a strong tendency for you to find confirming evidence, it is even better if someone else, not privy to your findings, confirms it.
	<i>Checking out rival explanations</i> – it is good practice to come up with one or more rival explanations which could account for all part of the phenomena under consideration. Keeping these 'in play' while you are analysing and gathering further data helps to prevent the premature closure effect.

Getting feedback from informants – this process of 'member checking' performs several functions: it honours the implicit contract between researcher and informant to provide feedback upon their findings; it also provides an invaluable means of corroborating with them.

Fig. 3.14 Assessing the quality of quantitative data analysis (based upon Robson, 2002 based upon Miles and Hubberman, 1994)

While the above approach is comprehensive and rigorous, it is noted that findings from all studies are not suited to such a broad assessment of quality. This study specifically engaged with a number of these quality assurance approaches throughout the analysis process such as checking for representativeness, checking for researchers effects, checking the meaning of outliers, following up surprises, looking for negative evidence, and checking out rival explanations.

Creswell and Clark (2007) and Lincoln and Guba (1985) state that in qualitative research there is more of a focus upon validity to determine whether the account provided by the researcher is accurate, can be trusted, and is credible. Validity comes from the analysis of the research and from the information gleaned from the informants (Creswell, 2009).

A variation upon member checking (Creswell & Miller, 2000) was utilised within this study to assess the validity of the proposed findings. A series of four expert interviews were undertaken in which participants were asked to comment upon the validity of (i) the research propositions, and (ii) the conceptual model of the role of futures thinking within design. In traditional member checking the investigator takes summaries of the findings back to key participants in the study and asks them whether the findings are an accurate reflection of their experiences (Creswell & Clark, 2007). Within this study a variation upon this process involved taking descriptions of the research propositions and notated visualisations of the conceptual model to informants who were deemed expert within the field. The selection of these experts was based upon similar criteria as outlines in section 3.2.2.3 (Sampling and identification of interviewees). The informants in the validation interviews were not previously involved in the study and were not interviewed as part of the first stage data collection. A full list of validation interviewees is provided in Figure 3.15. (See appendix A.2 for the interview guide used with these interviewees.)

All validation interviews were recorded, transcribed, and analysed utilising the process detailed in sections 3.3.1 to 3.3.4 and followed closely the protocols established within the study. Semi-structured interviews were employed once again but additionally utilised a series of visual prompts in the form of tables, figures, and models within the data collection of the validation interviews to illicit the views of the respondents. Specific attention was paid to their perspectives upon the validity of (i) the research propositions, and (ii) the conceptual model of the role of futures thinking within design. Interview transcripts and field notes were analysed to identify confirmatory disconfirmatory and disconfirming evidence. This process enabled the refinement of the conceptual model such that it represents an underpinned validity and reliability of the research findings.

Organisation	Employees	Sectors	Interviewees	Role	Date	Length
Product strategy consultants	15	Product strategy, market foresight, consumer insight, consumer propositions, design strategy, trend research, product design,	V:KM (+1)	Co-Founder and Director	16 December 2009	90mins
Product design consultancy	50	Product (medical, packaging, home wares, high-tec, consumer product, mobile telecommunications,), semiotic research, trend research, design research, innovation strategy	V:MH (+3)	Creative Director	19 January 2010	90mins
Large global design consultancy *	500+	Product (all major sectors); graphics, environmental design, service design, design research	V:SB	Senior Project Leader	19 January 2010	50mins
Product design consultancy	12	Product design, design strategy, transport, FMCG, premium brands, FMCG, packaging	V:RS (+1)	Founder and Director	19 January 2010	85mins

Fig. 3.15 Interview participants in validation interviews (second stage of data collection)

Creswell and Clark (2007) assert that disconfirmatory evidence, information that is contrary to the one indicated by the established evidence (in this instance within the research propositions and conceptual model), in fact can confirm the accuracy of the data analysis because in real life we expect the evidence for themes to diverge and include more than just positive information. Where there were instances of outliers or extreme opinions within the validation interviews, this informed the data analysis and what Miles and Hubberman (1994) term drawing conclusions by giving consideration to the causal relationship to these outlying perspectives.

The representativeness or generalizability of the research findings relate to whether the study findings are likely to have broader applicability beyond the focus of the study (Blaxter et al, 2006). Generalising from qualitative research is inherently problematic and as Lewis and Richie (2003a) state, 'there is much diversity amongst researchers in the meaning attached to the term [generalizability] and conclusions about whether qualitative researcher findings are capable of supporting wider inferences'.

3.4 Chapter summary

This chapter has presented a detailed discussion of the research methods available, the theoretical basis behind these approaches, and a justification of the actual methods employed and discussed the research methodology for this study.

The following chapter presents the findings from the research outlined in this chapter collected through a series of semi-structured interviews (n=20) with design professionals and research specialists. The analysis utilises the research propositions to provide structure to the presentation and analysis of the research findings. The following chapter contains six main sections (one for each of the research propositions), begins with an introduction, and concludes with a discussion section.

04

Research Findings

4.0 Introduction

This chapter presents the research findings. It contains analysis of the research data collected through semi-structured interviews (n=20). These interviews were conducted with research experts and design professionals. Data presented is drawn from six leading interviews and 14 supporting interviews. The research findings utilise the research propositions to structure the research data. As such this chapter has six main sections, one for each of the research propositions (sec.4.1-4.6), an introduction that establishes the context the chapter (sec.4.0), and concludes with a discussion of the research findings (sec.4.7).

The analysis of the research data resulted in two forms of empirically developed research items:

- *Substantive factors* (SF) are drawn from substantive instances within the research data. They are descriptive in nature. Substantive instances have been related to each other in a descriptive manner.
- *Theoretical categories* (TC) are derived through abstraction of the research data. They are interpretive in nature. They are created by clustering of descriptive data and creating conceptual links. This process results in abstract concepts.

Visual exploration of the research data aimed to understand hidden relationships. Substantive factors are arranged into groupings in an iterative and generative manner forming logical patterns of research data. These patterns are identified as theoretical categories. Theoretical categories are conceptual and interpretive. Substantive factors are subordinate to theoretical categories.

Theoretical categories contain a number of substantive factors and are more abstract in nature. Theoretical categories can be considered macro-analysis of the research data; while substantive factors should be considered micro-analysis of the research data. Fig.4.0 denotes the relationship between the substantive factors and theoretical categories, theoretical categories and research propositions, research propositions and research questions, and research questions and research aim.

Research findings are presented in a main section under the headings of the research propositions. The research propositions are noted below with the corresponding sectional heading following each proposition:

- RP01: Designers consider the future as an intrinsic aspect of the design process (sec.4.1)
- RP02: Designers use futures thinking approaches within the design process (sec.4.2)
- RP03: There are no commonly accepted approaches in futures thinking in the design discipline (sec.4.3)
- RP04: Designers appropriate futures thinking methods and techniques from other areas and augment them to support design activity (sec.4.4)
- RP05: External agencies provide future based knowledge for designing (sec.4.5)
- RP06: Futures thinking approaches are increasingly being employed in design (sec.4.6)

Substantial amalgamation of research data collected from the research interviews is contextualised with literature to present a coherent and complete picture of the research findings. At the start of each sections of the chapter, theoretical categories are presented in a table. Each theoretical category is then discussed in details with numerous quotations from the research interviews to substantiate the research findings. Appropriate literature provides a theoretical base for the presentation and discussion of the research findings.

There is inevitable overlap of concepts within substantive factors and theoretical categories. Due to the nature of this qualitative research approach, it is expected that concepts are not always boldly defined and there is overlap between the research findings. Rigorous analysis of the research data was undertaken but inevitable overlap means that it is not possible to categorise all of the research findings in a mechanistic way. The research findings are presented such that the major aspect of the research data is placed within the relevant research proposition, theoretical category, and substantive factor.

The research findings will now be presented in six sections related to each research propositions.

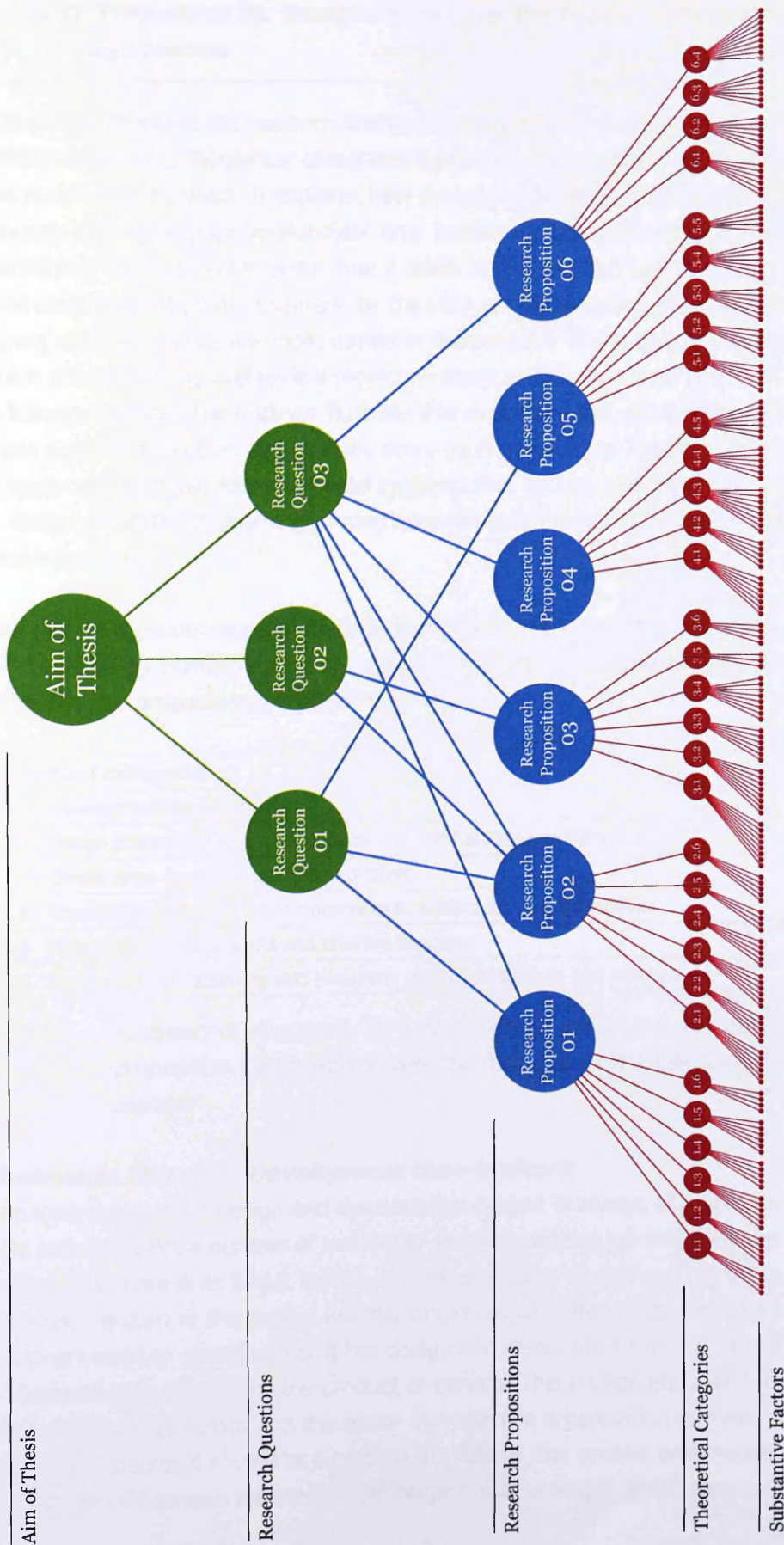


Fig. 4.0 Relationship of research aim, questions, propositions, theoretical categories and substantive factors

4.1 Research Proposition 01: Designers consider the future as an intrinsic aspect of the design process

This section presents the research findings against the above research proposition (RP01). It presents theoretical categories and substantive factors that support, or not, this research proposition. It explores how designers consider the future in the design process, identifying how development time horizons means that designers are always considering the future due to the time it takes to develop and launch a new product. It goes on to illustrate that designers, by the very act of designing, proactively create the future, although clients are more rooted in the present. This is due to the mechanisms by which clients manage and review projects – these approaches tend not to be conducive to futures thinking. The findings illustrate that designers also use intuition and instinct to make creative leaps that may, initially seem counter intuitive. They use creative triggers to ignite and energise future oriented projects. This section concludes with a discussion of designers' ability to seemingly move between considering micro and macro issues within projects.

This section presents research findings that generally confirm that designers do consider the future as an intrinsic aspect of the research process. The theoretical categories related to this proposition are denoted in figure 4.1:

Theoretical categories
4.1.1 Development time-horizons
4.1.2 Design proactively creates the future – a self-fulfilling prophecy
4.1.3 Clients drive focus on near time horizons
4.1.4 Translation and movement: unconscious, subliminal, and instinctive
4.1.5 Identifying starting points and creative triggers
4.1.6 Zooming in and zooming out: designers able to take micro and macro view

Fig. 4.1 Summary of empirically derived theoretical categories representing the proposition 'Designers consider the future as an intrinsic aspect of the design process'

4.1.1 Theoretical Category: *Development time-horizons*

The launch date for a design and development project is always at a point in the future. This can vary from a number of months or years depending upon the nature of the project. This date is its target launch date for a product or service. The difference between the start of the project and the target launch date is the minimum period designers need to consider during the design and development activity in terms of the projected future context for the product or service. This p depends upon the type of project being undertaken and the sector in which the organisation operates, but the target launch date is always at a point in the future. The project time-horizon describes the difference between the start of the project and its target launch date.

The British Standards Institution (BSI) advises designers in the UK to set a 10-year horizon on new-product development activities if organisations are not to be caught out by unexpected changes in the market. Assumptions we take for granted today, in terms of consumer attitudes and behaviours, or market expectations, may not be evident or even relevant 10 years in the future. Consideration of the broad context and consumption landscape for future products and services, combined with the development time-horizon, challenges designers to consider the future as a key part of their activities.

Increasingly designers are being asked to address the broad context and consumption landscape of future products and services. Essentially they are being challenged to future-proof their work. Therefore the knowledge basis for future design proposals draws upon past experiences and current understanding of a given situation to inform future directions. Although we live in the now, our experience is based on the past, but the decisions we have to make are exclusively about the future. We project our experiences onto the future as this helps us to understand what is to come. In line with this, respondents stated

If we're designing something now, by the time it comes out to market, is it going to do the job it needs to? Because of what other people are doing you've got all those sort of constraints to take into account. (RS_06)

For one of our clients what we're designing today has got to last for ten years and it's going to be in pretty much every retail area that you go to up and down the UK. Ten years is a long time and therefore you almost have to say Well, in technology this could happen, from a consumer point of view these are the things that are happening, and you almost map the future from the things you know. (KS_05)

The development time-horizons that designers engage in, combined with the anticipated useful lifetime within the marketplace of future products or services, present challenges. Designers are required to provide solutions that are appropriate to the needs of clients, end-users, and the market, not only on launch but also throughout its lifetime. The timescales and associated lag involved in design and development is discussed by one respondent below:

In a graphics programme it can be coming into the real world in three months or less. Hardware tends to take nine months to eighteen months to incubate. The reality for product development is it does take a long time to get right, ramped up through a specification cycle, out of a factory into the channels, you have to be thinking about one to two years out. If you're designing for today, you're already stale by the times it ships next year, so you have to be thinking about the future. (IM_05)

Ensuring that products and services are not out of date by the time they launch requires understanding the drivers for change in the future. One respondent observes

We are pretty much designing in the future anyway, probably more the future than now, if that makes sense. In some ways it is difficult designing that far ahead. ... That's the

interesting thing where you've got to be constantly moving ahead of yourself as you're designing. (RS_06)

Future user and market requirements are increasingly being addressed by designers within the design and development process. One respondent noted that 'there's a lot more responsibility on the individual designers to consider the future as part of their everyday activities' (WN_08). The focus upon future needs does not negate the requirement for designers to consider current needs within design and development projects.

It is clear that development time-horizons impact upon designers in three key ways: (i) there is always a time delay between commencing a design project, its completion and its launch, (ii) products and services are consumed beyond their launch date thus designers must consider the consumption timeframe within their design and development activities, and (iii) designers need to address both current and anticipated future end-user needs. Development time-horizons must consider the development period as well as the anticipated life cycle of future products and services as the minimum timeframe for future oriented design projects to ensure that proposals are not out of date on their launch.

The substantive factors associated with this theoretical category are denoted below:

Theoretical category	Substantive factors
Development time-horizons (4.1.1)	Project time-horizons; development times result in lag between design activity and delivery; manufacturing lead times; time to market is at a point in the future

Fig. 4.1.1 Substantive factors associated with the theoretical category 'Development time-horizons'

4.1.2 Theoretical Category: *Design proactively creates the future - a self-fulfilling prophesy*

Designers create products and services that are intended to be used in the future and as such are proactive in 'shaping the future' (SR_02). Designers are responsible for the objects and environments that make up the world. This world is constituted by products, services, and systems that have been shaped by the involvement of designers as part of an innovation system. The transition from future design proposals to present-day cultural items is a key aspect of self fulfilling design activity. Designers create the future by imagining what it will be. Designers visions of the future become the reality of the now is highlighted by one respondent:

You've got a picture of what the future is going to be because that's what they've decided it's going to be. (SR_02)

Essentially normative in their approach, designers make judgements about what ought to be rather than what is. For example, if you work in the fashion industry, it's not that people gravitate towards a particular colour, colour trends are decided by a select group. One respondent states colour trends are communicated by 'a select group who decide that purple is going to be the new black, and they are essentially disseminated out. In that sense there's that very proactive "We are going to decide what the future is going to be, we will set the agenda"' (SR_13). The activities of designers can determine the future by making decisions that become what we accept as the future. Respondents noted:

Well you said it so that means it is, you know, it becomes a self fulfilling prophesy. (MK_06)

One of the interesting things about being in our position is because we get to see an awful lot of what other clients are planning, and what their strategic plans are, in some ways you've got a picture of what the future is going to be because that's what they've decided it's going to be. So actually you can use that as a very good way, a very proactive way, of shaping the future and as you know what the other people are doing, so it's really a question of riding that same wave. (SR_02)

Design consultancies are able to base their future visions in the knowledge of what other clients are thinking and therefore how this may be manifest in future strategies. One respondent stated

Design is a very promiscuous business so we get to see a lot of a little. Or sometimes we get to see a little of a lot, it depends which way you look at it. (IM_03)

Designers have the ability to shape the future by understanding what organisations want it to be, and making this tangible.

I think they (designers) are good at seeing things. Paul Smith always claims he sees ten times more than anyone else. He'll say, I'll walk down the street with you but I'll see ten times more than you will. But I think this is all part and parcel of what makes designers different and therefore, what makes our way of understanding what the future could hold, understanding what the future could be, and also saying how we can shape the future. (SR_07)

By creating products and services for the future, designers need to be able to future proof the output of their creative activities. Future-proofing is the process of trying to anticipate future developments, so that action can be taken to minimise possible negative consequences, and to seize opportunities. In design, future-proofing is concerned with providing design solutions with longevity that are able to last beyond short term fads and changes in consumer buying behaviour. Future-proofing is being presented to designers by clients as an aspect in briefing criteria and the challenge of providing future-proofed solutions is increasing.

We always think about the future in our work and more and more the briefs that we get will talk about future-proofing. It's the word that everyone loves at the moment, and all the things we pitch on, and all the things we're asked to consider, talk about it. (KS_05)

Central to the concept of future-proofing is the requirement to minimise negative consequences of future products and services while seizing current market opportunities. These requirements can potentially be at odds with each other as timescales to seize upon an identified market opportunity can be short and near-time, while the minimising negative consequences needs a longer-term perspective where a range of criteria must be assessed for conflicts. These considerations also need to be mediated by the appropriateness of any potential solutions to the current and future values of the organisation.

You'll have many different filters. What's going to be accepted on the market? What's achievable? And what's right for us? We might find a really good material, it's going to be wicked, init? Yeah but, where will it fit within our brand? What will it mean for our brands? (AR_07)

Another interviewee highlighted the challenge when trying to consider the context of use in the future stating

You can't predict what the vibe's going to be, what the mentality is going to be, or what the market place is going to be like, but you can design with longevity in mind. (PB_05)

While the designer as navigator of conflicts and manager of trade-offs was observed by the following interviewee:

I think with good designers what they're doing is that they are juggling a number of deeply incompatible and competing concerns, and trying to come up with a highest common denominator ... Rather than lowest common denominators, they don't go for the easy solutions, they always try and push the envelope, add value, and make things better' (SR_16).

Extended development time-horizons are challenging. The longer the timeframe being considered, the less precise forecasting becomes as the environment that is being operated in, becomes more likely to experience change. Although project and design domain dependant, the optimal time-horizon for design-led future based activities was discussed by a number of interviewees. For example:

In terms of the time horizon we might be doing stuff in the immediate right the way up to seven to ten years. I mean, beyond that, you're into really kind of futures, it's speculative, completely. We're probably comfortable with sort of the five to seven year time horizon as a maximum because I think we have a means of understanding those kind of human anchor points, or the anchor points that are driven from human behaviour, or need, or cultural association, that is a far slower turning wheel along the timeline than the kind of colour material finish technology when you're doing that. We can understand people better, we can use those anchor points to kind of hang some other assumptions off to build credible future scenarios. (SB_24)

An organisation’s culture influences how designers engage in future oriented activities. The manner in which clients conceptualise their future, in terms of their long term strategy, is evident in many of the values that underpin projects. In some instances this is tacit and not articulated to designers explicitly. In some cases, clients were clear on the future oriented aspirations of their organisations. Indeed these aspirations underpinned the desire and decision to utilise design-led futures to drive their organisation forward. Organisations externalised the value they placed on design-led futures thinking as a driver for innovation and therefore creating the future.

More and more we are having to think of the future because of who we’re working with. I think our client base has shifted. We’ve really changed the direction that we’re moving in and I think, because of that we’re working with some visionary brands now rather than ones that we were always playing catch-up because of who they were, and we are having to think of the future. (KS_09)

We can conclude that there is a relationship between the clients and the scope of future oriented projects. Increasingly designers stated that the future was a key feature of their thinking even when this is a challenging element of projects.

When designing we have to think about the future and that is one very, very difficult thing to deal with. When it comes to helping organisations innovate, because as a designer we do that by default, I strongly believe that every designer is a forward-looking, future-oriented person. (PR_05)

I think predicting the future is very fluid, I mean it’s really hard to pin something down. (JL_07)

By proactively create the future, designers establish visions of the future

Designers are able to translate propositions from the present by creating visions of the future. To achieve this, designers present a vision of what the future could be in a way that is tangible and this can be engaged with. By imagining future products and services, designers populate the future to an extent that the future becomes a self-fulfilling prophesy. By being anticipatory to future states, designers attempt to future-proof their visions and ensure a connection between client’s expectations and market requirements. The self-fulfilling prophesy is enabled by matching designers creative vision with future requirements – of the market, client, and user.

The substantive factors associated with this theoretical category are denoted below:

Theoretical category	Substantive factors
Design proactively creates the future – a self-fulfilling prophesy (4.1.2)	Designing for the future; self-fulfilling prophesy of design activity; deciding and shaping the future by own actions; setting the agenda results in creating the future; future-proofing

Fig. 4.1.2 Substantive factors associated with the theoretical category 'Design proactively creates the future – a self-fulfilling prophesy'

4.1.3 Theoretical Category: *Client agendas focus activities on near time horizons*

Clients manage projects based on the culture and working practices of their organisation. This approach can prevent projects from being truly future oriented as the requirement to provide evidence for the viability of the project results in evolutionary, rather than revolutionary, development. Providing validity evidence for future oriented projects is inherently challenging. Organisations may require evidence to support or validate future directions but it is not possible to provide this in the same form as near time horizon projects. This situation can drive organisations to gravitate towards projects that consider the needs of near time horizon projects above future oriented projects.

Clients play a pivotal role in the manner in which designers approach projects and the level to which they engage with the future (as noted in 4.1.2). The complex relationship between key stakeholders, particularly client and consultant, inform the tenor of future oriented projects. Interviewees identified the limitations placed upon projects by clients as restricting the level of futures thinking that could be drawn into projects. Additionally, the specific nature of the project impacts upon the type of work designers feel is appropriate to undertake. One interviewee clearly didn't feel that the future was a key aspect of their day to day thinking.

Do I think about the future? I would say the answer is quite honestly not that much. We're doing things like kitchen tools, even the best line in kitchen tools is only going to be in the stores like four years or so before clients feel the need to like re-style it, re-design it, or the retailer feels the need to swap it out. So I think the future for us is actually quite short-term. (SHL_05)

We can see that not all projects and clients are appropriate for future oriented approaches.

The need to provide a rationale for decisions related to future oriented solutions highlight an important factor – evidence based design. Clients want designers to provide concrete information that not only supports a particular design direction, they want a guarantee that this is the most appropriate direction to follow. Often organisations seek to utilise past data, actions, trends and approaches to validate future actions, but this approach is against innovation as it restricts thinking to the known. Where designers can add value is to question the past and provide new or novel possibilities to existing situations. One interviewee observed by using a quote often attributed to Henry Ford, 'a designer would not propose a faster horse, a designer would propose a car' (SR_16). Another interviewee elaborates:

The clients that I work with, they're all in the past, and they have to because that's the way organisations work. That's the way you fund projects, you need numbers proving that your intent, what you actually want to do is that there's a return on investment. Your only way of getting numbers to do so is to look at something that has been proven and that, by necessity, is in the past. They always look at their past as their history to prove things that might happen in the future, which is fundamentally against innovation. We

cannot do that. So we struggle with that, that every organisation they all move things forward through what happened in the past. (PR_10)

...

You need to rationalise, you need to make an argument and in the future and you can't really ... If you could create a mechanism or a way that allowed them [clients] to rationalise things in the future, that would be great. (PR_17)

The reasons why clients do not, or are not willing to, undertake design and development projects that are future oriented are many. As identified, one reason is that of validation. Organisations are often bound by decision making processes that are based in risk aversion and as such need decisions to be underpinned by supportive data. They seek empirical evidence for design decisions – something that just may not be practical or possible. This position was summed up by one interviewee by stating that future oriented projects only happen 'if the client lets us' (TO_01).

Another reason why organisations do not engage with future oriented design projects is that of organisational culture. Some organisations have a tradition of developing innovative future facing solutions, such as Philips, Apple or Nokia, where other do not have this approach embedded in the DNA of the organisation. There are many examples where organisations have actually developed an innovative technology or a novel application for an existing technology but do not see its long term value. As such they may stifle the possibilities that exist of navigate away the huge opportunities that are present. One respondent observes:

We get a lot of projects that seem to be in the future but really they're not in the future. Very rarely do we get to actually exercise that skill about truly thinking about into the future. I think that's really unfortunate. (JO_06)

A constraint identified by respondents is the specificity of projects requirements. Although designers may be able to provide future oriented services, the nature of the project may demand an alternative approach.

I think it's an individual approach definitely, a really individual approach. I know a lot of designers that are very involved because of their work that are involved in current fads and trends, so they'll be designing very much what looks and feels great and communicates right now, whereas a different kind of design company who might be designing for other kinds of clients needs to be thinking about the future. I think it's a completely individual thing that depends on the brief. (PB_05)

Not all client focus upon near time horizons, in fact interviewees also noted the exact opposite. One interviewee identifies instances where 'they [clients] have a really set understanding of what they're actually after, what they want, and what they think is right for them and you run into situations where what are they're asking us for is bullshit! It's like, that doesn't make sense. Nobody wants what they're asking for' (PR_01).

Interviewees noted that clients often come to designers for out of the box or blue-sky thinking even if it doesn't make business sense but do so to promote a future oriented image for their organisation. There are times when clients want to engage design to create provocative and promotional tools that are not intended to actually be produced. Companies use future oriented conceptual designs as promotional tools that help them develop a company image of innovation, and also as stepping stones for future developments.

This section has considered how clients drive development projects to consider near time horizons. In relation to the proposition designers consider the future as an intrinsic aspect of the design process, it can be concluded that even if designers are future oriented in their outlook, the client's approach is an important factor in the nature of projects. Where organisation culture, risk averse decision makers, and the need for evidence for future based decisions prevail, projects tend to be focussed upon near, rather than far, time horizons. Exceptions to this are evident where clients want to develop a future oriented image for their organisation even if this is to the detriment of business viability.

The substantive factors associated with this theoretical category are denoted below:

Theoretical category	Substantive factors
Client agendas focus activities on near time horizons (4.1.3)	Client and brief dependent; if the client let us; can't make a demonstrable rationale for the future; clients are in the past, and have to be; project release dates being in the future doesn't mean designers are thinking in the future; short term future

Fig. 4.1.3 Substantive factors associated with the theoretical category 'Client agendas focus activities on near time horizons'

4.1.4 Theoretical Category: Translation and movement: unconscious, subliminal, and instinctive

Designers are able to synthesise and translate research data, from a variety of sources, and cast this back to clients in a tangible and understandable form. This process is undertaken in an unconscious and instinctive manner often involving some level of pattern recognition. In doing so, designers are able to translate information into an understandable form, creating movement from disparate information to a coherent form.

The manner in which they communicate this information is in response to the requirements of the project, client, available resource, timescales, and experience and skill of the designer. One interviewee observes:

I think that they [designers] are synthesising a lot of abstract data from the research, and they're coming up with ways that they can take that information from the research, and feel what it is like to experience that particular thing that they're trying to solve. Designers are taking all of that input and their big challenge or task going forward is

finding a way to articulate those insights into a tangible reality that makes sense for the client. (JO_02)

As noted in chapter 02, the ability of designers to synthesise and translate seemingly unconnected or disparate information into tangible form that can be understood has been recognised as a key attribute of a designers' competency. This transformational ability can be both powerful and effective in progressing design and development projects, as well as a means to illicit stakeholder views upon the likes and dislikes with regard to design proposals. Respondents support the abilities of designers to translate and process research data, for example:

It's pretty amazing, it's like an infinite amount of variables that you could come up with, but I think designers are really amazing at editing and collating, and collaborating and communicating. (JO_02)

Designers are very, very good at movement. So that means obviously, moving from data to observation, observations to insights, insights to ideas, ideas to concepts, and concepts to product. So it's that movement that designers are very good at because it's a movement that is not necessarily linear and it's a skill set that I find that people who've come from more linear-thinking backgrounds, like MBA students, don't really have. (LW_05)

Designers are able to undertake this transformational process - a characteristic of design that many other industries do not possess. Designers are able to harness this process and develop new ways of looking at something that may result in radically different or novel forms of expression. This is illustrated by respondents:

If you look at what design does that other industries don't do, we are uniquely able to synthesise very disparate information into completely new ideas and things. I'm not saying no one else is able to do that, but designers, A - I think they have that type of brain, it's wired that way, and B - they have the skills to visualise it, to imagine what never was. It's the George Bernard Shaw quote of "You ask why, we basically say why not?" Designers imagine things that never were. (SR_07)

The strength of a designer, they can take tiny, tiny number of facts and make a huge decision. Now remember engineers need a huge number of facts to make a tiny little decision. It's the opposite way round. (WN_03)

In undertaking the transformational process, the translation of research data to tangible entities, designers often rely on gut instincts and intuition (RI_05, AR_14) and can be powerful in the early stages or the fuzzy front end of projects. One respondent observes:

It's very interesting because we did a collaborative project with Adidas and they work completely on gut ... Often the gut can be the start of a project so you can put some stakes in the grounds. (AR_14)

Respondents identified unconscious processing of information as a key element of designers approach, with one interviewee describing this approach as 'a synthesisism of ideas that you can then communicate' (RI_05). They elaborate:

I think designers are unconsciously synthesising, and sometimes consciously, but I think a lot of design happens in an almost unconscious way, where you're holding a lot of information in your head that you've been taking in, that you've acquired through research. You're exploring, you're trying to sift through it and you're trying to see where those ideas can lead. Where two or three disparate ideas can all of a sudden come together and like the pieces of a jigsaw just kind of fit and you go, Wow that's great. That becomes a synthesisism of ideas that you can then communicate. (RI_05)

The use of 2D visualisation, particularly drawing, was identified as a contributing factor to designers being able to undertake this synthesisism and note that drawing helped to (i) help designers to think out loud and externalise their thoughts, (ii) communicate these thoughts to clients, and (iii) assist in the development and not solely communication of ideas. This view is supported by the following respondent:

I think part of it is unconscious, I think that you get into a certain mindset with the brain, paper and pen connect ... I think when you sketch it, you dream it up as you want it to be. So you dream it up literally, you free yourself. It's the one moment where you can be free, and then the more experience you have, you bring it back into reality. But I think there needs to be this moment of total freedom where you become a visionary for a moment, then you pull it back, if you don't have that moment, it's not going to go far enough. It needs to have this moment where your mind plays. (TO_04)

As identified, interviewees discussed a strength that designers possess is that of being able to identify patterns in seemingly disparate information and translate it into a usable and coherent form. One respondent stated that:

[Designers] are able to move from something that seems somewhat counter-intuitive or illogical, and move toward something that practical or usable like an insight, or like a next manifestation which is an insight to an idea. I think it's that movement, it's that ability to synthesise the different inputs, and really recognise the patterns to enable this movement to the next stage. (LW_05)

The value design brings via this movement or translation in the development future oriented projects is captured by an interviewee stating 'you can analyse the past, engineer the present, but you have to design the future' (WN_03). Design plays a key role in the translation of the present into the future, particularly when they are creatively considering new and novel approaches. One respondent observes:

I think you see designers operating at their most creative when you're looking beyond the market that exists now and you're not really referencing things in the market that exist. Quite often the projects that we're doing involve entirely new ways of looking at where a brand can go, so this is about paradigm shifting and this is big thinking. (SR_15)

The substantive factors associated with this theoretical category are denoted below:

Theoretical category	Substantive factors
Translation and movement: unconscious, subliminal, and instinctive (4.1.4)	Work completely upon gut instinct; editing, collating, collaboration, and communicating and making sense of this for a client; unconsciously synthesising; subliminal communication; very good at movement – from counter-intuitive to usable insights

Fig. 4.1.4 Substantive factors associated with the theoretical category 'Translation and movement: unconscious, subliminal, and instinctive'

4.1.5 Theoretical category: **Identifying starting points and creative triggers**

Much of the effort, energy and activity in future oriented projects goes into the early stages of the design and development process as it is here that designers can bring to bear their creative abilities in the identification of entry points into projects. Referred to as *the fuzzy front end* (FFE) of the design and development process, this early phase is critical to defining the nature of the problem that is being addressed through design and is generally regarded as one of the greatest opportunities for improvement of the overall innovation process, although activities in the FFE are often chaotic, unpredictable, and unstructured.

Identifying starting points for projects can be driven by many factors including market conditions, technological developments, shifts in consumer behaviour, as well as creative insights. Designers need to be able to accommodate the plethora of factors that can be used to trigger a project and as such need flexibility in their approach. In addition, the breadth of possible project triggers may require mediation and trade-offs between contributing factors and stakeholders. The role of the designer here is to extract appropriate starting points for projects in light of all environmental concerns, building upon existing knowledge and experience. One respondent explained:

We never start from zero because we've always been researching trends so they give us a starting point. We're always tracking things that are going on. So already there's this kind of rich foundation. (SB_08)

Interviewees related the FFE to phase zero projects (IM_02, JO_01, PR_04) identifying common characteristics between these two activities. One respondent elaborated:

I tend to go on what we call phase zero projects which are more about design research and really trying to understand, with the client first of all, not with the solution is, but what's the question? What are we trying to answer? And then going out into the field and talking to the end-users. We try to find inspiration that will help the client take whatever they're doing in a new direction to more closely meet the needs of the users. (JL_02)

Phase one projects precedes the project approval and launch of the actual product development process. A project mission statement may be developed at this point which specifies the target market for the product, business goals, key assumptions, and constraints. After defining what the opportunity is, resources can then be mobilised as

'you need a whole team of incredibly talented people to actually execute well on that momentary enlightenment' (IM_05). Interviewees affirmed that once the starting point for creative activity was identified, there are numerous factors still to be addressed and a coherent plan of action is required. There is also a selection process whereby only a proportion of potential project trajectories are taken further, and into the design and development stages of a project. This is illustrated by one respondent:

You weed out what you feel resonates with the direction of where you want to go and you keep your little jewels, and you release the rest. And you try to start getting clarity and simplicity without being simplistic. At that stage of our process, we come up with what we call insights and design principles ... It's the same kind of thing in a synthesis process, you make these kind of maps of correlations. And after you do all that and you come up with a set of principles. Design concepts start from there. (JL_06)

The output of phase zero activities are often formulated such that they trigger design activity in a way that is meaningful. The manner in which this information is delivered varies greatly between organisation, projects, and sectors. This information can take the form of a design brief, mood boards, images depicting market, technological or consumer insight, strategy reports, interactive multimedia presentations, etc. A unifying theme is the use of the scenario concept to tie together much of this information. As one interviewee stated:

Strategy includes the story, what the story is, what we're trying to get out of the scenario, the situation. So a lot of it is showing the focus, where we want to give a focus, and what is our future intention. (AR_05)

Clients also provide direction for design-led future oriented projects as the requirements that they wish to address through the creative process are often a critical driver for the strategic direction of projects. Within a consultancy/client context, designers are commissioned to address the issues deemed appropriate by clients, notwithstanding that an aspect of this process involves the interrogation of the brief and challenging of existing perspectives.

Whenever there's a need for a new product or service or anything, that doesn't come from the designer, that comes from the client and that's because they want to make money out of it. By willing it corporately, they create a vacuum that kicks off the process. The nozzle at the end of that vacuum in some senses is the designer because they're going to fill that space with what culturally resonates or will sell, and all the, all the kind of human and material and physical and makeability skills will make that product or experience possible. (SB_05)

Here, the role of the client is central to the strategic requirements and future direction of the project and is setting the agenda. The position that designers are serving the client resonates with the concept of design for profit, where organisations primary concern is with the bottom line. Designers may be interested in challenging the norm and pushing boundaries but in business terms, good design can often be defined as that which sells

well. This is not to say that boundary challenging and progressive design endeavours do not make good business sense as well as satisfying designers' desire to innovate in response to the client's needs.

The development of a strategy that informs design-led future oriented projects and trigger design activities can be informed in number of ways. Often information is transformed or reconfigured by designers, via mapping techniques for example, to ensure the relevance is both apparent and available to all stakeholders in the project. Being able to see the relevance of information is an important factor in successful projects. Respondents stated:

Another thing we do regarding the future is bringing in expert opinion, and then having a design analysis or apply design thinking and therefore taking what the trends say and saying Well, therefore that would probably mean this on products. So it's translating the conclusions into something design or product friendly. (SR_15)

They [designers] can work with some really thin stuff, just out of their heads, do you know what I mean, and they'll still pull some magic out that makes it amazing, and you'll want to play with it and you'll feel engaged with it. But the richer material you provide them with, the better the product is going to be almost in a kind of mathematical scale. (SB_05)

Research techniques are often employed within design to assist in the identification and translation of information into a format that is credible and useful for design and informs the strategic direction of projects. Information is usually drawn from a number of sources and triangulated to ensure its validity, for example:

We would start off by doing focus groups to then analyse the current situation and get all those needs, desires and all that kind of thing. This is really useful but consumers don't necessarily know what they necessarily want so from that perspective we're looking to social-cultural trends. And from that we'll start looking at category-contextual segmentation and try from all that data to create a strategy. Then from the strategy we obviously create the language and the philosophy for design (AR_03)

The need to utilise creative research methods, often ones that designers are well versed in, such as ethnography, cultural probes, and un-focus groups, is apparent and as noted by the above interviewee, consumers are not always able to articulate that they desire, particularly as time-horizons extend. Consumers can be limited by their own understanding and imagination.

Triggers for creative work can be drawn from many sources, under the remit of key stakeholders including clients, designers and consumers. Permission for initiating these activities is not necessarily something that is provided in an explicit form and may need to be something that members of the development team seize themselves and proactively go out and create the future in their own image.

You can achieve a certain amount of critical momentum and create that chain reaction and therefore you do influence the future. Apple has basically created a situation for itself where it is riding the sort of, the shock wave that it creates for itself. So it is constantly re-setting how the future is defined. Apple now does that. No one gave permission to Steve Jobs to reinvent the music industry, he just said "Fuck it, I will". And he did. In that sense, he determined the future. I think this is a key point, the difference between proactive and reactive." (SR_13)

The substantive factors associated with this theoretical category are denoted below:

Theoretical category	Substantive factors
Identifying starting points and creative triggers (4.1.5)	Rich foundations, never start from zero; understanding the 'question' that links clients to users; maps of correlations, insights, and starting points; translate information into design friendly format; proactively resetting how the future defined; create data rich foundations for strategy creation

Fig. 4.1.5 Substantive factors associated with the theoretical category 'Identifying starting points and creative triggers'

4.1.6 Theoretical category: *Zooming in and zooming out: designers able to take micro and macro view*

Consideration of the future within the design process requires the awareness of both micro and macro issues that impact upon the development process. Designers ability to both see the big picture as well as the ability to zoom in on specific issues has parallels with approaches of futures thinking. In *The Art of the Long View*, Schwartz (1991) identifies the transition between macro issues, 'looking down on the forest', and micro issues, 'examining the blades of grass' as central to effective futures thinking. The ability to engage with micro and macro trends manifest in such things as consumer attitudes and consumer behaviours can help to provide vital clues to the relevance, potential, and usefulness and developmental trajectories. One respondent stated:

Due to the fragmented nature of consumer markets, there are many more niches than there ever have been and I think that people are zooming in on one particular niche and trying to fulfil the needs and wants of that niche. They're trying to understand the big picture and trends is a great way of taking a snapshot of all the things that are going on out there and saying, okay, this is what's going on, are you addressing one or more niches? what's the big picture? and then having done a broad evaluation of the context, it's then to choose the direction carefully, and I think for our clients what they're interested in is getting to an opportunity first and when they get there, protecting it. (SB_03)

The raplex environments (rapidly changing and increasingly complex) of today's consumer markets, with ever increasing levels of complexity and unpredictability, combined with seemingly endless opportunities offered by technology development, has challenged designers to be ever more sensitive to the demands placed upon other

stakeholders involved in the development of new products and services. One respondent observes:

Designers more in tune with context issues now than they maybe were ten, fifteen years ago. I think that the marketing people that we work with, and the brand managers and stuff are much, much more design aware and design savvy they ever were and by the same token, I think that designers have to become more aware of their needs and their wants. (SHL_07)

While understanding both micro and macro issues are critically important for designers to have an informed view that underpins consideration of the future in the design process, their ability to be aware of current changes within these environments is also key. Being aware of what’s happening in the here and now informs future developments where revolutionary change and evolutionary continuity can co-exist. This ability to select a micro and macro lens, as well as being aware of revolutionary and evolutionary change are aspects of both design and futures thinking.

The substantive factors associated with this theoretical category are denoted below:

Theoretical category	Substantive factors
Zooming in and zooming out: designers able to take micro and macro view (4.1.6)	Understanding big picture; fragmentation and niche areas; designers in tune with contextual issues; awareness of needs and wants of stakeholders

Fig. 4.1.6 Substantive factors associated with the theoretical category 'Identifying starting points and creative triggers'

4.1.7 Summary

This sections has discussed the research findings for the research proposition, *designers consider the future as an intrinsic aspect of the design process*. It has discussed the theoretical categories and substantive factors, and contextualised this within appropriate literature.

This section presented research findings that confirm that generally designers do consider the future as an intrinsic aspect of the research process. The theoretical categories and substantive factors related to this proposition are denoted in figure 4.1.7:

Theoretical categories	Substantive factors
Development time-horizons (4.1.1)	Project time-horizons; development times result in lag between design activity and delivery; manufacturing lead times; time to market is at a point in the future
Design proactively creates the future – a self-fulfilling prophesy (4.1.2)	Designing for the future; self-fulfilling prophesy of design activity; deciding and shaping the future by own actions; setting the agenda results in creating the future; future-proofing

Client agendas focus activities on near time horizons (4.1.3)	Client and brief dependent; if the client let us; can't make a demonstrable rationale for the future; clients are in the past, and have to be; project release dates being in the future doesn't mean designers are thinking in the future; short term future
Translation and movement: unconscious, subliminal, and instinctive (4.1.4)	Work completely upon gut instinct; editing, collating, collaboration, and communicating and making sense of this for a client; unconsciously synthesising; subliminal communication; very good at movement – from counter-intuitive to usable insights
Identifying starting points and creative triggers (4.1.5)	Rich foundations, never start from zero; understanding the 'question' that links clients to users; maps of correlations, insights, and starting points; translate information into design friendly format; proactively resetting how the future defined; create data rich foundations for strategy creation
Zooming in and zooming out: designers able to take micro and macro view (4.1.6)	Understanding big picture; fragmentation and niche areas; designers in tune with contextual issues; awareness of needs and wants of stakeholders

Fig. 4.1.7 Summary of empirically derived theoretical categories and substantive factors for the proposition 'Designers consider the future as an intrinsic aspect of the design process'

4.2 Research Proposition 02: Designers use futures thinking approaches within the design process

This section presents the research findings against the above research proposition (RP02). It presents theoretical categories and substantive factors that support, or not, this research proposition. It considers how designers draw research data into the design process and the sources that used for this data. Designers facilitate futures thinking in design projects by providing information in a meaningful and persuasive manner which enables strategic decisions to be made. These decisions are based upon a keen understanding of users, facilitated through the application of ethnographic research methods by designers. In doing so, designers create visibility for future oriented projects and create thought pieces – products and services that connect with the viewer in such a way that they engage on an intellectual level. Designers often utilise futures thinking approaches within the design process without even knowing that they are doing so. The monitoring of trends for example is a case where designers are engaging with futures thinking methods in the design process.

This section presents research findings that support this research proposition namely that *designers use futures thinking approaches within the design process*. The theoretical categories related to this proposition are denoted in figure 4.2:

Theoretical categories
4.2.1 Drawing information into the process
4.2.2 User observation as design input
4.2.3 Facilitating futures thinking
4.2.4 Assist in strategic decision making process
4.2.5 Representing timescales
4.2.6 Creating visibility: visual and experiential communication

Fig. 4.2 Summary of empirically derived theoretical categories for the proposition 'Designers use futures thinking approaches within the design process'

4.2.1 Theoretical category: *Drawing information into the process*

Information that informs design projects is drawn from a wide variety of sources, is obtained in a variety of ways, and utilised at different points within the design process. This information is utilised to shape the manner in which designers engage with futures thinking in the design process. Information is also generated within the design process that underpins the development and communication of design-led future oriented projects.

The nature of future oriented information, in the form of written reports for example, may not be in a format that is easily digestible by designers, being data heavy and dense in nature. A filtering process was noted by some interviewees where research oriented designers, or even design literate but not design trained researchers, filter this information and provide it in a format that is both useful and accessible to designers. The volume of information available was cited as a barrier to everyone within design and development teams being able to engage in a meaningful way with this information. Organisation of information was a key challenge and criteria for the use of future oriented information within design activity. One respondent stated:

Obviously there's all the kind of publications and reports that people here read. Those types of reports might be quite different within the research team than those read by designers, there may be a bit of an overlap but we're always at the very different industry leading shows and events, seminars and conferences the world. The information comes in thick and fast, and we go to great lengths to try and organise that, but I think it's fair to say, I mean, going back to the fact that we have to cut our cloth to fit the need of the project that usually starts with some kind of internal brainstorm review of the domains in which that information will reside but, we need to go and look at. And if we don't have it, we'll go and get it. (SB_08)

The breadth of information available within a particular market sector, and beyond this sector yet still pertinent to the sector, requires a structured approach to organising and understanding the implication for design. There is a need to make sense of this information for specific projects and mediate between the vast array of information available and the specific requirements of the project at hand. Respondents discussed their approaches to the collection and research information below:

We basically analyse markets, we fly out and analyse markets, and analyse consumer behaviours, needs, shifting needs, shifting behaviours, shifting desires, like all those things, values, value sets that shift, like all those shifts, we identify those and make sense out of them for one particular client, on this single three month project. (PR_06)

Well, obviously, with having offices sort of dotted around the globe, that's very useful from a market analysis point of view, so for example, in Hong Kong, might get somebody over to Japan to have a look what's going on over there, same thing in the States, the States in a massive market different to, obviously, Europe and the Far East, and, in the UK we'll get people on planes out to Barcelona. So we'll get some good market analysis. (RS_03)

Organisations that operate upon a consultancy basis, i.e. working for multiple clients, normally operate across a range of sectors. This diversity of activity provides opportunities for a breadth of understandings that can be applied within specific projects and across multiple projects. A benefit of utilising external consultancies is that working with multiple clients produces a breadth of experience. One interviewee labelled the process of drawing information and associated learning from multiple projects *meta-factors*.

We want to tap into all those individual pieces of learning and extract that meta-learning out of it. What are all the same learnings of a similar product that probably give you a pretty safe idea. If that assumption has come up on fifteen different projects there must be something there, there must be something true about that assumption so we try to create those meta-assumptions, meta-factors we call them, and use those as starting points to get an idea of what's interesting or what might come up. (PR_06)

The process by which these meta-factors are identified, synthesised and communicated both internally within organisations, and externally to clients, is approached differently across organisations. Some noted that this approach provides an organisational point of view upon a given topic and can become a strategic differentiator within the marketplace and allows for a 360° panorama viewpoint.

Within all those phases of research and all the different projects we do, there'll be a lot of different insights that overlap. I think we're trying to tie in all these insights into this collection which is like a point of view piece where it'll be IDEO's point of view. That'll be a collection of all the different work we've done internally and externally for clients and it'll feed off a lot of the research work we've done in projects. And then we'll actually use that point of view to present back to different clients or new clients and say, Look, this is stuff that we've been noticing and working on, it's happening now, this is our take on it. (MK_08)

The use of futures thinking approaches within design also encompasses a range of research and analysis approaches that on first inspection do not necessarily seem to be relevant to the focus of a specific project, or able to contribute to its direction. The use of tangential research approaches is clearly evident in design-led future oriented projects. There is no way to effectively market research a genuinely new product or service and as such designers engage with research methods that enable access to tangential, analogous, lateral, and peripheral information in creative and innovative ways.

We do what we call analogous visits. That can be so many things. If I'm asked to design a hard drive, I might go to the library and just look at a lot of stored information, in a very, very analogous way. Think about what could be analogies that could inspire me or give me a different perspective on it. They can be very censorial, it's like if a hard drive is all about security, how does security feel? Maybe I go into a prison and really experience the emotions of security. (PR_08)

As well as analogous research contexts, interviewees cited the use of extreme perspectives and lead-users as a valuable contribution to futures thinking within design. Interviewees cited extremes and extreme users as a valuable area for research data, for example:

You look to sub-cultures, extreme users, people who live off the grid, or people who live like crazy connected or extreme grid, you know, like not the 'average Joe couch potato' but someone who's doing something kind of radical and interesting and different. (JL_08)

Generally we'll do an in-depth qualitative research phase, going out to talk to users, interviews and that kind of thing, and pick quite specific users really extreme cases, at either end of the spectrum or whatever the scenario is get inspiration for what are the real extreme ends of the problem. Then we go through this research phase, and that'll be all documented and we come back and download all that. (MK_02)

The sort of people that you talk to aren't mainstream, they're people out on the edge, so I would call them front-line panels or future panels. So there's a process of again, talking to people, but people that are the leading edge, and people that will have very different perspectives from your mainstream consumer. (LH_02)

The role of extreme users in design and development is to provide insight into the outer edges of behaviour and in turn this extremefied approach will gradually be adopted by more consumers and become the norm. This is supported by interviewees thus

The thing is if you talk to the two end of extremes like the book-ends of the experience, you'll understand new ways of doing things and ideally those will I guess trail-blaze the path of the more conventional end-user in years to come' (JL_03).

These extreme views or behaviours can then be used to trigger creative activity, through a process of, if you like, creative application and through talking to these leading edge people, we began to create something that had almost like an attitude or a behaviour sitting behind it' (LH_03).

The view of experts in the form of expert opinion contribute valuable information to future oriented projects and is a well used technique for the elicitation of insight into the future. The valuable contribution of experts was noted by respondents:

Well a lot of the time it's about using the best available sources of info out there. If we wanted to understand more about energy futures, don't try and become experts yourself, go and speak to an expert on that. We try and have a fairly loose affiliation with a number of people and we can go and speak to and we always try and bring in expert opinion at the start of any project. (SR_07)

In our process, the types of research we're doing goes from desk to field. We have a big network of experts which we really tap into and they're kind of specialist experts, so they're people who are really focussed on particular areas. We can call them and say "Okay, we're doing a project, can you come and bring some stuff and they'll work with us" or they'll literally just give us a brain-dump and from that we'll decipher what really is useful. (AR_03)

Experts can be involved in projects in a variety of ways, from a one off brain-dump to an extended engagement that co-locates them as one of the design team. Experts may be used to co-create or co-design around a theme appropriate to their area of expertise.

Faith in the expertise of experts is based upon the understanding that knowledge in a specialist area will also provide knowledge about the future. In light of this perspective, the use of expert opinion in future oriented projects should be carefully considered, with particular attention paid to recruitment and selection. Clients value the opinions of experts often feeling that an informed opinion from an expert can use seen as a validation for decisions and future direction. One respondent observes:

If we're doing quite a complex problem that we can't become the experts, we bring in industry experts who we act like a panel to bounce ideas off as well as, just showing it to the client. So it's not our opinion then, it's actually certified, we've heard this from the experts so it's pretty useful. (MK_04)

So information is drawn in to both trigger and drive the development process and as has been identified, can be drawn from a variety of sources in a wide range of ways. The value of this information is to support decision makers in the strategic development of future oriented projects in the pursuit of new and novel ideas.

The substantive factors associated with this theoretical category are denoted below:

Theoretical category	Substantive factors
Drawing information into the process (4.2.1)	Future oriented publications and reports; market analysis; meta-learning and generalisations from insight; analogous visits and situations; extreme users; expert opinion

Fig. 4.2.1 Substantive factors associated with the theoretical category 'Drawing information into the process'

4.2.2 Theoretical category: *User observation as design input*

The user as a source of inspiration in design activity has been claimed to be key to successful design and development and has grown in popularity amongst development teams over the last two decades. Utilising ethnographic approaches and data capture mechanisms, such as digital and video cameras, designers often undertake a quick and dirty form of ethnography that helps them to identify creative insight based upon observation of users in natural contexts. Designers are able to analyse the behaviour of users in these natural contexts and translate this information into insight that is a

powerful trigger in the development process. Designers ability to identify needs people didn't even know they had is a seen by many as a core and potent competency of design. This is noted by respondents, for example:

We rely on observation, and I think what designers are innately good at doing is spotting discontinuities, innate issues, latent needs, emerging behaviours, new stuff. If you could use the metaphor of scanning a supermarket shelf, you don't process any single thing, you tend to see the outlines of things and where things don't compute to what you expect to be there, or they are different from whatever, they are the things that stick out. I think that's quite a good analogy for what designers tend to do when spotting behaviour or watching people use things. Whether it be from functionality point of view, whether it's about spotting the work-arounds that people invariably develop with bad products. You'll see people holding the phone to their ear while they do all these kind of weird things that people have developed over the years. You can either just say, Oh that's just the status quo or you can say Well, there's an opportunity to make something more convenient, or there's an opportunity to make it more pleasurable, or there's an opportunity to make it more fun, or more involving, something like that. Or less fucking difficult! (SR_08)

The link of user observation to design-led futures is through the innate understanding of human behaviour and how this behaviour transcends time, i.e. people are the constants in these processes and do not change their behaviour overnight. One interviewee stated that 'working in the future is about understanding, really understanding profoundly the old cliché, the insight, but really profoundly understanding why people do certain things and knowing that's not fundamentally going to change' (SR_02). Another interviewee supported the value in understanding human behaviour in design, specifically:

I think vis à vis the future, understanding certain fundamental things about human nature and how people use things and why they use them, helps you predict and allows you to make fairly reliable predictions. It at least gets you in the right area and then you can recalibrate and fine tune. (SR_03)

Ethnography can provide user insights that can be used as creative triggers that can assist in the consideration of new and novel approaches to existing contexts. One respondent elaborates:

We rely a lot on what we loosely term ethnography, but really we call it forensics. That is our word for it. And it's just a way of picking apart things. We're looking at a very broad range of areas and we're looking for clues. Sometimes they're just creative leaping off points, sometimes ethnography or forensics is a very good creative can-opener, it gets people thinking in a certain way. (SR_08)

This process places people at the centre as they can provide the inspiration and challenge that designers consider.

We believe that people affected by something that doesn't function are the best inspiration to make that all better. We believe we can observe people, talk to people, get to the source of the problem and solve it with design thinking in the broadest sense. Basically doing

research, understanding, experiment, and then run that by the people, again what you come up with, and then do it. (TO_02)

Designers are able to use an understanding of what the user is actually experiencing, rather than what they say they are experiencing, and use this to empathise with users needs, wants and desires as well as frustrations, work-arounds, and confusion. For example one respondent states:

I think designers empathise ... It's not just about empathising with the end users, we empathise with different teams that are involved in getting a project from A to B, so I think empathy is a huge thing for designers. Successful designers have to understand and make sure that that's very, very clearly got across to the client, of the benefits of understanding the end user. (TT_14)

Once out in the field designers are able to experience first-hand the types of challenges and contexts that users live through each day. This process provides designers with an understanding of human behaviour in the now, and through creative endeavour, develop future proposals that both harnesses the insight generated in today for benefit tomorrow. While gaining insight into user behaviour, they can absorb information that can be useful in not only the decision making process during the design activity, but also provide validation into proposed future directions.

The designers actually really value the customer input. I think any industrial designer understands that, if they're going to solve a problem, it's absolutely critical for them to be in front of customers and understanding how they're doing it. If they go out on a research trip and they see certain things, they've got fodder for doing some cool innovation. (GM_10)

Although the current behaviour patterns in the now is essential, this needs to be augmented by how people may behave in future contexts. Designers often rely upon an iterative process of exploration to identify worthwhile directions that meet future needs, wants, and desires.

So it's looking at these things but then applying, if you like, an understanding of the way that people might behave in those situations. Will they really do that? I don't know. So, it's getting insight into people and their behaviour as well as an understanding of the possible things that people can do. (LH_06)

Interviewees stated that designers are well placed to translate these user insights of the now, into solutions for the future, and 'understand how the things that are going on out there can be harnessed in terms of future products or experiences. (SB_18)

The substantive factors associated with this theoretical category are denoted below:

Theoretical category	Substantive factors
User observation as design input (4.2.2)	User observation and insight; ethnographic research approaches; empathetic design activities; harness and understand the implications of trends; consumer voice in decision making

Fig. 4.2.2 Substantive factors associated with the theoretical category 'User observation as design input'

4.2.3 Theoretical category: *Facilitating futures thinking*

To benefit fully from engaging with futures thinking, design needs to ensure that the innate value of considering the future is facilitated effectively within the design process. This can involve the use of forward looking projects to develop creative competencies within the design team, or appropriate communication of future based knowledge to project stakeholders. Designers are often at the centre of the facilitation of activities and transfer of knowledge throughout future oriented projects. Their role is twofold: (i) to engage in future oriented projects to develop capabilities and competencies to be able to undertake such activities, and (ii) to engage wider stakeholders in design-led future oriented projects. A critical factor in this role is to draw upon their creative skills to ensure that proposals are both accessible to the proposed audience, and that the target audience can see the relevance and value in these activities.

Design organisations undertake internal future oriented projects to develop capabilities and competencies within the design function. These internal projects serve to develop designers but also as a counter to the more near-time-horizon activities. One respondent stated:

I think a lot of the more creative design projects that we run internally are more just to flex designers muscles a little bit and just keep their brains a little bit looser than the day to day projects that are a bit more grounded' (MK_08).

In adopting this approach, organisations break away from ordinary design routines and to motivate employees to do something different. These activities can assist organisation in the development of knowledge for future activities with clients. In some instances design organisations undertake in-house to generate background material for forthcoming external projects. Projects allow free thinking that can then be translated into more concrete, near-time-horizon actionable proposals. Respondents observe:

Frameworks are used then to fuel or initiate design and coming up with ideas, and then it starts to go back down to the more concrete where you're trying to bring it back to life with ideas and sketches and that kind of thing. (MK_02)

We encourage designers to leave the conventionally understood field of design and become comfortable and au fait in research skills and language and become comfortable in how to analyse and harness trends. (SB_17)

It's those things where the boundaries just become a little bit freer and we can explore some more conceptual ideas and we can think a little bit more about the future and explore conceptual ideas. (MK_08)

Organisations often use future oriented projects to demonstrate their abilities in considering the future. In the same way as the automobile industry develop concept cars, design organisations develop analogue projects that demonstrate such abilities. Concept cars stand out as great examples of experiments used to inspire the market and prepare it for new ideas. Organisations develop realistic product concepts and present them to the public and the media to get feedback on our interpretation. This approach helps organisations to assess if they are on the right track.

Presenting clients with information in a form that they not only are able to understand, but are stimulated by is an important consideration for designers when facilitating future oriented activities. One respondent elaborates:

We were showing the start of something but also we were showing them a lot of data, that everybody was familiar with round that time ... There's data to support all of that because over a long period of time, I'd been monitoring and tracking a lot of things, so you can pick up on all of that data. But it doesn't really help the client. The client goes Yeah, that's really interesting. I'm glad I've known that, I've been very stimulated by your presentation but I don't know what to do with it. (LH_03)

Clients need to be able to see a series of actions that this information can support. There needs to be a logical progression from interpreting information into implementable actions. This may require design to enable possibilities to be made concrete such that a committed team of people can then make happen. The implications of research information were commented upon by the following respondent:

People have got something to sort of look at and be stimulated by. ... I only use this material if clients could engage with the material and think about what the implications might be for them. So I might present a couple of things, get them to sit back and start thinking about how that might work for them. So for me, it's always been very important, is that engagement. (LH_04)

In addition to providing triggers for the creative process, research information is seen as acting as providing validation to actions where, due to the inherent uncertainty of planning for the future, stakeholders look to research in its various forms to provide a safety net to decision making, for example:

Sometimes at the start of a project we'll want validation from it and the research can act as validation, but a lot of the time the research is producing a kind of catalyst, of demonstrating areas. So we're looking at different areas to offer us opportunity because within our research we look at a lot of contextual areas in terms of both looking backwards and forwards, and then the socio-cultural research gives us evidence and almost validation when we think the trend cycles are going to come round. (AR_04)

Interviewees noted, with some caution, that transition of ownership of information between the various stakeholders can potentially be problematic and needs to be treated with care. When development teams include various functions within an organisation, design acts as the constant within the various conversations that take place across the duration of projects . One respondent noted

It's all about the transition of ownership of the information to the design, because you don't want to have a situation where we're doing research and we're writing the report and we're handing that report over to somebody else and okay, now they're going to implement, it doesn't work, so we have to be engaged. So we look at ourselves as facilitating now, not just design but also engineering and marketing. (GM_09)

This facilitation approach often places design in a central role where the various stakeholders are being coordinated by design. One respondent elaborated:

We are now asked to facilitate an innovation pipeline process for our division, beyond industrial design, our particular group, but for an entire division. (GM_07)

The ability to facilitate futures thinking within the design process requires both organisational and creative skills and not all designers are suited to this activity. Some teams are built up of designers who understand future oriented activities, but are also made up from specialists in complementary areas of activity including from the social sciences, such as ethnographers, anthropologists, psychologists, and sociologists; and from management, such as strategists, project managers, business planners, and human resource experts.

The right personalities are all important on trends-driven projects, creative projects, absolutely. This is why we've got fewer trend specialists than designers. It's not just to do with the kind of company that we are, it's much more to do with the fact that we're trying to find the right balance in the team between trend specialists who aren't designers, they're reporters really, and designers who can actually understand and harness trends. (SB_14)

The substantive factors associated with this theoretical category are denoted below:

Theoretical category	Substantive factors
Facilitating futures thinking (4.2.3)	Projects to flex designers minds; fuel designing, act as catalyst; people need to be inspired by information; highlight relevance of information; understand and harness trends; ownership of knowledge

Fig. 4.2.3 Substantive factors associated with the theoretical category 'Facilitating futures thinking'

4.2.4 Theoretical category: Assist in strategic decision making process

Although as identified in 4.2.3, designers are involved in the translation of future oriented information into tangible concepts that enable feedback upon the efficacy of proposed

direction of projects, they are also involved at the front end of projects where the potential trajectories are explored and identified. In this early stage engagement, designers provide strategic direction and enable the focussing of effort into moving projects forward. This approach often requires research to be conducted to inform decision making. Interviewees stated that engagement with strategic decision making was becoming more evident in their day to day activities and had potential for increased activity in the future, for example:

We're doing a lot of strategic projects like these phase zero we call it, where the end outcome might be a few ideas, but it's more to do with scoping out a strategic path for companies to take. So I see a pretty big opportunity there because ... I think probably where we would make a lot of money is coming in as this external company and bringing a new kind of spin on a more strategic level. (MK_08)

The role of design in business has shifted dramatically over the past few years such that design is increasingly being recognised as a key business asset. This move involved design in facilitating abductive reasoning and opens up new avenues for design to engage with organisations and the creation of strategy (Martin, 2009). Abductive reasoning, or what Liedtka (cited in Lockwood, 2009) terms 'the logic of what might be', is often embedded in the manner in which designers engage with future oriented projects. One respondent observes:

Some of the companies that we work with, who tend to be some of the smaller or the middle sized companies, we try and get involved with them on more of the strategy side of things as well and the positioning of their products not just designing. If they come to us and say, we'd like you to design a toaster for us and stuff, it's more of a question of why? Why do you need another toaster or what are you trying to say with this. What's everyone else doing, what's the development there, let's look at what it means to the company as a whole rather than just think about that individual project. (SHL_03)

The ability of designers to step back from the now and think about the big picture was noted by several interviewees as important in the development of the strategic path, and helps to establish what is needed to address critical issues beyond those of the boundaries of the organisation. Within the context of design, the development of the strategic path usually results in the identification of a number of opportunity areas that organisation can consider in light of their overall strategic mission. The identification of an opportunity area may involve the creation of place holders that assist organisations in the understanding of how these opportunities may be addressed and also how this opportunity may become manifest within both their organisation and the marketplace. One respondent observes:

A client will come to us and say, Look, what's the future of blah blah blah. It'll be maybe three months and it'll be frustrating, maybe more sort of strategic rather than tangible so I think that's kind of the interesting tension here, especially when you are consultants trying to find your own comfort level with how tangible some of these projects can be. So a typical project might, like one of these phase zero's, might result in three or four

opportunity areas that we give a client and we give them some kind of tangible, version of that opportunity area. (JO_01)

The research undertaken can inform decision making such that there is a knowledge base to underpin decisions. One respondent elaborates:

All the leading successful companies have acquired things that give them more authority whether it's the business case or whether it's the science case. (SB_11)

The increasing complexity of markets has resulted in the apparent need to validate decisions even before they have been acted upon. This need for validation of decisions has meant that designers are now, more than ever, required to communicate the rationale for their decisions and provide clear evidence of the steps they envisage taking. This evolutionary rather than revolutionary mindset was particularly evident in consultancy organisations, for example:

It's increasingly important to be able to map it out better in terms of timelines or in terms of steps that show the gradual shift. It's what we call the sort of mum to mud to mad to dad transition process. It's basically how you go through from one thing, something completely contrary in steps, so it's mum to mud to mad to dad. (SR_15)

The requirement of rationalising decision making, particularly in strategy development, has resulted in the need for design organisations to develop new skills sets and approaches that provide clients with an acceptable level of confidence in the decision making process. The mum to dad stepping stone approach above highlights the requirement to articulate the reasoning behind a decision making process. One interviewee highlighted the link between new skill sets and rationalisation of decision making stating:

We've invested in certain types of skill sets that allow us to rationalise our decision-making and to articulate the reasoning as well, and to decode some of these trends in quite sophisticated way and identify the patterns and relationships between them. (SB_03)

While ensuring clients have a sufficient level of confidence in the strategic decision making process, there is still a need to provide designers with a similar level of confidence and charge them with the mandate to conduct future oriented strategic projects.

I think the best market leaders are examples of clients or companies that are thinking about the future. They're exercising their own vision of the future, they're creating the future. So it's being able to give designers permission to be able to behave in that way that's important. (JO_07)

There is a balance to be struck between the needs of both clients and designers in terms of strategic decision making. By being overly subservient to clients, designers run the risk

of not challenging the scope of the project, while designers need to be aware of commercial imperatives of projects and resist the temptation not to be self-serving.

The substantive factors associated with this theoretical category are denoted below:

Theoretical category	Substantive factors
Assist in strategic decision making process (4.2.4)	Scoping out strategic path; strategic rather than tangible; steps to gradual shift; company-wide perspective; designers own vision of the future

Fig. 4.2.4 Substantive factors associated with the theoretical category 'Assist in strategic decision making process'

4.2.5 Theoretical category: *Representing timescales*

The target time horizon that future oriented projects engage with varies between organisation, client, sector and project. Interviewees noted that 5-7 years was a sweet-spot but no consensus upon the most appropriate or effective time horizon was evident. The further into the future, the more abstract and conceptual projects tended to become. This is line with much of the thinking in future studies noting that as time horizons extend, exacting information is harder to generate in a reliable and valid form. One respondent noted that in near-time-horizon design activity, projects are subjected to scrutiny regarding their ability to do what it set out to do, specifically:

Basically because the normal day to day process has a defined endpoint, a defined deadline, and more defined criteria for success, people say, Did it do it or didn't it? You know the notion that a design is only as good as it fits the criteria. (WN_09)

Where time horizons extend, the ability to assess the success of meeting specific criteria is lessened.

Designers engage with future oriented projects as this provides a creative licence to explore opportunity areas in a conceptual and blue-sky manner. This is in contrast to near time horizons that require a clearer connection to commercial imperatives.

Respondent SB elaborates:

I think the common perception is that it's easier to address trends that are short term, not that far off, than it is long term. I think designers and creatives love the long term stuff because there's so much more freedom and what if? And there's much less constraint and much more flexibility in thinking. The nearer term for designers present much more nuanced and more controlled harnessing of these disparate elements, or things that appear to be quite disparate, and that's a far more sophisticated challenge. You've only got to look at some of the futures concepts that you've seen in mobile or telecoms, and think well it does look seriously futures, but of course it's a creative license, isn't it? Designers really love that and excel on it. But the here and now or the short term is far more connected to commercial trends and understanding of markets as well. (SB_15)

Extended time horizons require the use of communication skills that are more experiential and narrative than explicit and closely defined. Painting with a broad brushstroke may be required to engage the audience with your future proposals without providing too much detail such that they become overly focussed upon the implementability of proposals. The movie industry has been doing this for many years and are able to create the impression that draws the viewer in albeit with the knowledge that these visions are not real. One respondent stated:

Well as you move further out you need to get into much more experiential type storytelling to engage the consumer and get feedback. You're moving very much into more narrative I think, so you're designing scenarios where you're trying to put the consumer in this future place or future environment that you're creating to have them imagine what it would be like interacting or being within that environment. The way you set it up starts to dramatically differ, so it gets into much more richer storytelling and more use of storytelling tools like edited video or illustrated scenarios. (LW_08)

One interviewee picks upon the value that science fiction writing can bring to the communication of future oriented projects and how this can provide a conceptual link between the now and the future. The identification of what we already understand from our current world and transpose this to a future context is a key trick in the designers arsenal when communicating future oriented projects.

Tomorrow is just an exaggeration of the future of today. The best science fiction writers will just take something that they've seen or they've experienced and spin it off into maybe not a logical conclusion but just an exaggerated conclusion of some kind. That gets you far into the future so to speak and I think that's the same kind of approach that we take is that we just consider what's happening now, and see how it can be extremefied if you will. What happens when that behaviour or that phenomenon becomes extreme, what does it imply, what does it need to support its existence, what will it cause to happen? (RL_08)

The presentation of future oriented projects in a positive manner to ensure buy-in from stakeholders is also a communication approach that is employed when time horizons extend. By creating and communicating a positive image of these proposals, designers are engaging essentially in foresight driven approach where foresight is not the ability to predict the future, but make a contribution to desirable changes. Respondent SR observes:

I think we also challenge, predict or create the future by reacting to what other people are claiming the future to be. At their best designers tend to be optimistic and humanistic about the future so they do present generally, a more attractive vision of it. I think that there's a lot to be said for presenting a more attractive vision of something. People go Oh, let's make it sexy. What they mean is make it scintillating, make it spellbinding. If it's sexy enough, they will come. It's that kind of if you build it they will come. In visualising it, in presenting it in the best way, even though it may not be the best solution, by its own sexiness, it will draw people to it, so I think more proactive This is what we want it to be, use all your powers to make it so (SR_16).

In foresight activities, experts offer opinions that are aggregated to form a view of possible futures, which can be used as a guide into the future. Based on knowledge on how things will be, not on how they are now, foresight can be more reliable and informative than a simple extrapolation. By providing a desirable image of future situations, design is engaging in normative foresight approaches. They draw people to the future they have envisioned.

The substantive factors associated with this theoretical category are denoted below:

Theoretical category	Substantive factors
Representing timescales (4.2.5)	Defined end point; short term vs. long term; experiential communication methods; today extremefied as tomorrow

Fig. 4.2.5 Substantive factors associated with the theoretical category 'Representing timescales'

4.2.6 Theoretical category: *Creating visibility: visual and experiential communication*

Respondents noted that it is challenging to effectively communicate the volume and nature of research information generated in future oriented design projects to all stakeholders within the development team. Increasingly organisations are utilising a combination of technological and traditional mechanisms to support knowledge sharing across projects.

We've got a Wiki so we publish on that. We're doing more and more by way of posting work up within public areas in the studio so people can see what's going on. We also have knowledge-sharing workshops every other week so project teams or individuals will be asked to present work or experiences that they've been through or particular challenges that they've faced to the whole company so that everyone can get a feel, get insight into some of the things that are going on. It's a really easy thing to get wrong in a business like this. The reason for that is everyone's got their head down, everyone's beavering away, projects go through and then people don't get to see them, so I hope we're better now than we've ever been at knowledge-sharing. (SB_20)

The time pressures of the day job was identified by a number of interviewees as a barrier to being able to effectively share knowledge gained within projects to the benefit of all project stakeholders. Communication with clients is also a key challenge yet is often given higher priority than communication within the design team. Client communication may involve a process of consultation where negotiation takes place such that clients are involved in the decisions that relate to the communication of the research. One interviewee noted:

This [communication] is often done through a process of review with the client as well. Although there's a graphic style the actual structure of the information is only organised once a client has bought into that way of mapping it so the framework or however it's

chaptered, these are things that have to fit into a client's way of thinking about information and the way in which it's digested' (SB_21).

Visual communication was noted by many respondents as being the key criteria for communication at all levels and designers were deemed both competent and capable in this activity. The translation of data gained from research activities was given a high level of importance within the overall design and development process, and designers held this responsibility throughout the process.

Visually, that's the best way for us to kind of communicate that kind of information. It doesn't make sense for us to try and do it in a kind of statistical table or report format and nor would we ever take that approach. ... The other kind of classic way to do it is to do the minutes of the board meeting from 2010. What do they look like? The headlines for the newspaper, what do they also look like? (RL_09)

By utilising such techniques as minutes of the board meeting or headlines from next year's newspaper, designers translate future oriented information into a form that is readily understood by the general public. Again concept cars (or show cars) were mentioned to explain the approach organisations take in the creation of proposals for future oriented projects.

We do strategy show cars which are like the car industry do. Think of an analogy with the car industry and we show them at exhibitions, and it's a what-if, but they're really aimed around taking that reaction to that into the strategies to put into today's products. So they are the equivalent of concept cars never ever to be launched but to generate interest. We use them to see if everyone goes, Ooh, that's horrible you know. (WN_09)

The value in communication approaches such as concept cars is twofold. Firstly, the physicality of tangible objects enables interaction on an experiential level that facilitates sensorial engagement. Secondly this sensorial engagement can be used to provide feedback to the development team in response to the perception of the proposals. An extension of this approach is what one interviewee termed thought pieces where organisations deliberately create larger than life proposals that stretch their thinking beyond conventional boundaries. One respondent confirm this point:

I think designers will always pitch something further than it needs to go because it will inevitably get watered down or reined in. I mean, we do go out to just thought pieces as well, as I say, they might be deliberately antagonistic or thought provoking. (SR_16)

The exaggeration of existing conventions also provides designers with fuel to drive their creative endeavours and as time horizons extend, the level of creativity generally increases. This thinking can then be reigned in and made applicable in the now. It can allow original thinking to emerge from the process that is of value to the individual project, the organisation, the client, and the designers involved.

The stuff which is a little bit further out is fantastic stimulus and can quite often drive some original thinking that you can translate into the now so it's all valuable. We certainly find it valuable when we're having collaborative workshops with the client because if anything, it is common ground and its shared knowledge and that's a powerful thing. (SB_24)

It's those kind of things where the boundaries just become a little bit freer and we can explore some more conceptual ideas and we can think a little bit more about the future and explore conceptual ideas. We just went pretty much on individual instinct and just did the more of a self-expression piece. It was almost a bit more indulgent where you could just do something more blue sky. I think maybe sometimes those ideas, those projects, I really enjoy working on because it's more about expression and not necessarily all the time tied down to reality so you can come up with really original stuff. (MK_08)

Development teams need to be given the opportunity to first firm up the ideas being proposed and how they fit in a larger and more universal context. Participants need to be able to relate their thinking to wider issues and implications for clients and consumers. This position is advocated by one respondent:

There are lots of different ways of visualising the future and it depends whether you're being proactive or reactive. In terms of being reactive in the sense that you're looking at trends and extrapolating trends and seeing where they might go, we tend to try and visualise them as quickly as possible. These things are understood and already articulated trends but what we are aware of is that very few people have taken them and calculated what they would mean in design terms. What they'd mean in product terms, and therefore what they mean for the client as well. (SR_09)

This approach requires the use of both left- and right-brain thinking and collaborators must engage in a structured cooperative process that is guided by strong, rational leadership, but aimed at promoting new ideas and innovative solutions that will build the client's successful future.

The substantive factors associated with this theoretical category are denoted below:

Theoretical category	Substantive factors
Creating visibility: visual and experiential communication (4.2.6)	Knowledge sharing mechanisms; visual, physical or experiential communication; stimulus for creative thinking; thought pieces; what trends mean in design terms

Fig. 4.2.6 Substantive factors associated with the theoretical category 'Creating visibility: visual and experiential communication'

4.2.7 Summary

This section presented the research findings against RP02. Research findings provide evidence that supports this research proposition. Factors that affect the degree to which this proposition has been supported include the manner in which designers engage with (or have the opportunity to engage with) users; the research methods employed within future oriented design projects such as ethnographic observation, analogous visits, inputs

from experts and extreme users; the opportunities for designers to inform and engage with strategic thinking; organisation culture; and the ability of designers to assist and lead in the visualisation of the future.

This section has presented research findings that support this research proposition namely that *designers use futures thinking approaches within the design process*.

The theoretical categories and substantive factors resulting from the analysis of the data related to this proposition are listed in Fig 4.2.7:

Theoretical categories	Substantive factors
Drawing information into the process (4.2.1)	Future oriented publications and reports; market analysis; meta-learning and generalisations from insight; analogous visits and situations; extreme users; expert opinion
User observation as design input (4.2.2)	User observation and insight; ethnographic research approaches; empathetic design activities; harness and understand the implications of trends; consumer voice in decision making
Facilitating futures thinking (4.2.3)	Projects to flex designers minds; fuel designing, act as catalyst; people need to be inspired by information; highlight relevance of information; understand and harness trends; ownership of knowledge
Assist in strategic decision making process (4.2.4)	Scoping out strategic path; strategic rather than tangible; steps to gradual shift; company-wide perspective; designers own vision of the future
Representing timescales (4.2.5)	Defined end point; short term vs. long term; experiential communication methods; today extreme as tomorrow
Creating visibility: visual and experiential communication (4.2.6)	Knowledge sharing mechanisms; visual, physical or experiential communication; stimulus for creative thinking; thought pieces; what trends mean in design terms

Fig. 4.2.7 Summary of empirically derived theoretical categories and substantive factors for the proposition 'Designers use futures thinking approaches within the design process'

4.3 Research Proposition 03: There are no commonly defined approaches to futures thinking in the design discipline

This section presents the research findings against the above research proposition (RP03). The research findings reveal approaches that may inform commonly defined research approaches within the design discipline. There include use of frameworks (PESTLE, STEP) to assist in the organisation of research data; and identification of patterns that assist in the understanding and communication of mass of data. Project specificity does mean that bespoke programmes for the use of futures thinking activities in design may be required.

Applying designerly skills to identify problems rather than just responding to a predetermined agenda involves consultations with a range of stakeholders on a number of levels. Designers employ a process that although context specific, shares a number of common traits. Designers utilise the power of creating future propositions to draw out opinion and as such enable futures thinking in the design process.

This section presents research findings that generally do not support this research proposition, namely that *there are no commonly defined approaches to futures thinking in the design discipline*. The theoretical categories related to this proposition are denoted in figure 4.3:

Theoretical categories
4.3.1 Process
4.3.2 Context/project specificity
4.3.3 Consultation
4.3.4 Provide structure
4.3.5 Problem setting
4.3.6 Words and pictures

Fig. 4.3 Summary of empirically derived theoretical categories for the proposition 'There are no commonly accepted approaches to futures thinking in the design discipline'

4.3.1 Theoretical category: *Process*

Approaches to futures thinking in design vary greatly across sectors, clients, projects, and design organisations. Although there is evidence to suggest that there is no singular approach utilised in design to consider, explore, and communicate the future, tacit approaches were evident in the empirical data.

Interviewees detailed the lack of coherence or broadly accepted approaches to futures thinking in design with underlying processes not evident across respondents. Some commentators attribute this to the fragmented nature and diversification of design. The lack of consensus of the design process is amplified in its engagement with futures thinking. One interviewee, Head of Strategy and Insight at a large design consultancy, stated that 'there doesn't seem to be any real formula to what I do' (KS_19) while another interviewee stated that 'research process is not fixed' (AR_02). Flexibility in response to client and project requirements, and the ability to adapt and change were recurring themes, for example:

We're very flexible in the way that we prepare or go about organising our work, our processes and methodologies are flexible and adaptable and where they don't fit in a powerful way to the needs of a client or a market or a sector whatever that need might be, we will develop bespoke tools or approaches. (SB_01)

What we're constantly doing, and this is what keeps us sustainable, is we change the way we do things all the time. As soon as something turned out and has proven to really work, something that really established, we're over thinking it and we change it. (PR_11)

Respondents were not able to readily describe the process by which they engage in futures thinking in design, even when they were aware that they were centrally involved in these activities. Much has been made of the tacit nature of design often making design appear elusive, inarticulate, and even unknowable. When asked about the manner in which the future is considered in the design process, one respondent stated:

It's quite difficult to define it as a process I think because there is an element of intuition that is part of the process. I think the first thing is obviously being aware of the basic data and information but the second thing is talking to people that have much broader views of the way things are changing. This gives you ideas and thoughts and you pick up on it's basically, you're sort of using a combination of their brains and your brains to find something new. (LH_05)

Interviewees were able to describe in an abstract manner typical approaches that they employed during future oriented projects although they often did not perceive this as a formalised process which underpinned all projects. One respondent stated that 'there is a generic type of game plan for it' (RS_02) evidencing that there is a broad process by which futures thinking is considered in design albeit at an abstract level. Another respondent elaborated:

Well to be fair, this is not a particularly rigorous process. We would simply go on things that we felt had caused a buzz, had influenced design. We just base it on what the design press picks up on, what the other media picks up on, so this would be the kind of things that get featured in broadsheet and tabloid newspapers as well as specialist design press and cultural outputs. (SR_09)

Generic activities were described by a number of interviewees that encompassed information gathering in various guises, ideation and creative generation of possible paths, development of potential trajectories and consolidation of detailed information. A common element to the majority of respondents was a front-end immersive activity that provided project teams with orientation to the issues at hand, and in some instances was the main focus of their activity. This may involve designers immersing themselves in (i) the client's organisation, and (ii) the information gathered throughout the whole research phase. The first phase involves visiting the client organisation, speaking to key stakeholders and people in key positions where 'you're on the road gathering a lot of information' (PR_03). For the second phase 'you basically dump all the information into one big room, put yourself in there and close the door for four weeks and bend your brain around it because there's so much information' (PR_03). The main aim of the second phase is to 'organise all the information to eventually get some structure, some parallels and find some patterns. Eventually once you start find those patterns, you can identify gaps, you can identify needs and insights and all these things, until at the end of that you will have a framework of how you understand the market and opportunities out

of that framework' (PR_03). Usually involving a design-led team, with additional expertise such as ethnographers, social anthropologists, sociologists, and the like, this phase is key to translation of information into knowledge that is of use to any subsequent design activity. Although hugely valuable in the overall development process, it is sometimes seen by designers as alien to their skills and training, 'we're trying to enrich it more as much as we can with fun stuff because it's very dry, it's very brain-bending, and very wordy and for an industrial designer. (PR_03)

Another interviewee detailed a broader process that bears more relationship to commonly accepted descriptions of the design process (such as the Four Stage Design Process (Cross, 2000), or the Cascade Process (Koberg & Bagnall, 1972) for example).

We'll go through an emergence cycle called phase zero which is just information gathering, learning, understanding the landscape, understanding the challenges, and a snapshot at the competition. Phase one, the generation phase, is the main creative part, although it's all creative, will just be product ideation, solutions, user experience solutions, smarter better ways to do it, and that's where concepts are kind of narrowed down for development. Then phase two will be development, with all the nitty gritty of flushing things out, and 3D, usability, user interface construction principles, manufacturing principles, detailed definition files brought alive and shell pro-e with full specification for a model shop to make colour and material finished specs. Then phase three will be a transfer where we're kind of handing off information to somebody such as contract manufacturers, development houses. (IM_02)

Another respondent stated:

We have four levels of research and I always frame them in terms of questions, what do we already know? how can we innovate? what's the right product fit? and then how do we maintain focus through development? (GM_14)

The research process utilised by some respondents was deemed to be traditional in nature by some respondents involving many well known research techniques.

You know at the heart of it all it's quite traditional in terms of the method of gathering data. Literature reviews, peer reviews, desk research, consulting experts, reading a bunch, a certain degree of what somebody's calling it interestingly netnography, that kind of virtual ethnography online, and understanding cultures. ... There are new things that emerge that aren't traditional but the way of going about collecting the data is just research. (SB_09)

Depending upon the target time horizon under consideration, the nature of the research approaches do not follow existing norms and tend to be mindful of consumer understanding of the future. As one interviewee pointed out:

The whole way that you test [extended target time horizons] ideas, set them up, tell the story to the consumer to get some feedback is very different from working on a product like a telephone where the archetypes for the telephone are already well established, where it's to be released next year. (LW_08)

Familiarity with future oriented contexts is problematic as potential end users do not know what they want in the abstract. End users cannot possibly express useful opinions about a totally new product before they have had chance to see it.

The timescales under consideration for specific projects require the use of different research techniques to illicit consumer views upon visions of the future. One respondent elaborates:

There are different techniques for different timescales and the approach need to adapt. The whole way that you go about consumer research, the whole way you bring consumers back and get their feedback does have to change for the different timescales that you're looking at. If you're grounded in something that's going to be zero to three years, that will yield one sort of research activities. If you're looking further out than that, say three to seven years will yield another set of activities. Then seven to ten years plus out will again yield another set of activities. It's very difficult to use just standard concept-testing techniques where you're putting something in front of a consumer and asking their feedback on something that's designed for seven to ten years out. You're going to get very skewed answers and results because it's very unfamiliar to them. (LW_08)

The type of research techniques employed within research and development activities is dependent upon the target time horizon under consideration. As previously noted, standard concept-testing techniques may provide unreliable data. The research process utilised to glean consumer feedback upon visions of the future was deemed by some respondents to be lacking in rigour and in many instances highly subjective. One respondent observes:

There's not a lot of robust analytics out there that I've seen. It generally comes down to a group of culturally sensitive people all sitting round a room giving their point of view on what's coming next. We've tried very hard to develop a framework that's really going to help guide us and understand some of those underlying drivers. What essentially you need at the end of the day, and this is true of insights but particularly true of anything trend or future related, is that you're looking for logical but unexpected trends and forecasts. Often the problem with a lot of pure trend and future forecasting is it's just pure extrapolation, and it's very linear. There is always a non-linear element to it, there's always some provocation to that equilibrium, and that's the unexpected part. (LW_11)

The need to establish a structured approach to understanding future consumer preferences while acknowledging the non-linear elements of such preferences was evident within the research findings.

The combination of logical yet compelling communication approaches was foregrounded by respondents, for example one stated explicitly that:

You still need the logical progression to convince people that, or make a compelling case that, this is where things are evolving to. (LW_11)

When conveying visions of the future to potential stakeholders, there is a need to highlight logical progression (from the past into the future) and recognisable relationships (between actors and elements) to convince people of the efficacy of future oriented proposals.

Logical progression and recognising relationships are needed in the presentation of information in future oriented projects just as much as 'there are a million different ways of organising what we've already done' (SB_07). It is suggested that, as respondent SB observes, visually and experientially engaging approaches should be employed in communication activities.

In terms of how we do it, we make it visual first of all. We will array all our information in ways that can be used, that can be seen equally in fields of concern, or in layers, or stratify it. We can pick chains through as sources of inspiration or stories or narratives that are important to be followed. (SB_08)

Although no one communication was dominant in the responses from interviewees, it was noted that any methods will be used in any way as long as it is effective and efficient. One respondent elaborates:

We put them together into any method or any process, it can be long, it can be short, we can have different groups working on different things, but always just to extract the maximum amount of richness and inspiration. (SB_07)

While the diversity of communication approaches was noted by many respondents, there was agreement that approaches should be: visual (utilising both 2D and 3D approaches), engaging (to enable feedback to be drawn), experiential (often utilising narratives), and focus the viewer upon the potential benefits offered by any future proposals. Visual awareness is key to the designer being able to achieve appropriate communication yet this was noted by one interviewee that 'I don't think it's something that you can learn, I think it's something that you probably have an ability to do but I think it's something you get better at with experience' (PB_07). This visual ability is important when communication information.

The use of an explicit process within future oriented design projects was not clearly articulated by respondents. Although a series of interrelated activities were evident, respondents seemed unable to convey the detail of these activities in a concise manner, often providing an overview of their approach which left the underlying process implicit rather than explicit.

The substantive factors associated with this theoretical category are denoted below:

Theoretical category	Substantive factors
Process (4.3.1)	No formula, research is not fixed; constant change, flexibility, and adaption; difficult to define process; not rigorous, based on intuition; commonality within underlying process; levels and phases in research; structure, parallels, patterns, layers, array, and insights inform frameworks; adaptability to context

Fig. 4.3.1 Substantive factors associated with the theoretical category 'Creating visibility: visual and experiential communication'

4.3.2 Theoretical category: Context/project specificity

The breadth of the activities that design engages with presents stakeholders in any design and development project with a challenging environment in which to work. The context that these creative activities take place in need to be understood if any project is to be undertaken in a meaningful manner. These context specific issues, driven by the business, user or technological frame that stakeholders need to understand, imply that all projects need to be undertaken in a bespoke manner. Although tailoring projects to meet the specific needs at hand is important, some level of generalisation may be evident. In reality many of the underlying approaches adopted to develop innovative solutions are shared across projects. Approaches are tailored to the needs of specific projects but draw upon their experience in similar, or related, contexts. One respondent noted:

After receiving a brief from a client you look at the brief and then it's usually get together a handful of people, and spend an hour just thinking up methodologies that would be appropriate from everyone's experience. We'll talk through the brief and talk through what we can do. In that respect there isn't a formulaic approach. We're very much open to finding out or trying to create what we think is the best solution to this brief. Naturally, there's a toolkit of methodologies which we pick and choose from. (RH_05)

Respondents stated that they were willing to adapt to the needs of specific projects and felt that they had a range of abilities and experience that enabled them to take on pretty much anything. As many of the respondents were consultants this take on anything is not unexpected as they earn their living meeting the needs of clients. One interviewee stated that 'we tailor the process to suit the different projects' (MK_03) and 'we haven't got any set template type thing that we use' (MK_06). There is a balance between responding to projects in a bespoke manner and drawing approaches from 'a toolkit of methodologies' (RH_05). Some respondents noted the need for processes that are responsive to specific needs of a given project, namely: the feasibility of available opportunities (technological perspective), the viability of possible trajectories (business focused), and the desirability of potential proposals (user focus). Approaches varied across respondents within the study with no consensus upon the level of formulaic approaches evident.

One interviewee noted their involvement in the planning of projects in response to clients as:

Understanding what we can use in terms of trends, futures, or other similar activities to add value for the client, and in the process come up with a suitable methodology on the one hand for us to be able to do something sound here, and a realistic delivery depending on the audience that it will have. So, we've got to be able to formulate it in a way that can be applied in the end. (SB_01)

The ability of designers to respond appropriately to the needs of specific projects is also dependent upon the competencies and skills evident within the team. The make-up of project teams varies between organisations, sectors and budgets, and is once again is noted as being dependent upon the nature of the project.

Involvement of team members across all stages of the project is also dependent upon resource availability and draws upon the range of strengths of team members.

Respondent MK observes:

Sometimes we try to do it so that everyone's involved right from the start and all the way through which is the ideal scenario. The last project I worked on was like that and that worked out pretty well. We were all there for research, all there for the design bit, and each team member shines at a different point in the process. (MK_01)

Although the use of experts with particular skills was evident in projects, interviewees stated that a core team was employed in the majority of projects. Teams are usually constructed around the specific needs of a project with team members selection based around skills, expertise, and experience. Where skills gaps are evident in a team, flexibility and willingness to develop new skills was noted by respondents.

The role of team based approaches in design is still the predominant mode of engagement in contemporary practice. Design team members need to take responsibility for allocated tasks but also a collective responsibility for the outcome of the project. The synergetic possibilities presented by design teams are of prime importance in the justification of engaging with design in development projects. This is expressed by one respondent:

There's a big period of exploration and then there's a period of creativity, what I would call divergent thinking, or fishing with a big wide net, and then you get to an inflection point where you know what you're trying to do and the creativity changes to convergent creativity. The crude metaphor I like to use is kind of like hunting for buffalo where the whole tribe's trying to figure out what buffalo to bring down and once somebody says It's this one here. Then the whole tribe concentrates on bringing down that one buffalo. So there's a real inflection point from exploratory, diverse thinking to, Okay focus gentlemen, we're going to bring this one thing down, and detail it out in excruciating detail. (IM_02)

The specific activities undertaken within design and development process encompass a plethora of undertaking that vary in degree from context (and by implication project) specific to more broadly defined generic processes. Where clients either do not value particular activities, or do not have the resource to pay for specific activities, design

teams can undertake such activities within the process to assist in the overall performance of the project. For example, designers may not be directly commissioned to undertake project specific research, but often decide to undertake such research to underpin the ideation phase of the project. This need to be informed prior to undertaking design activities provides designers with a challenge – do they undertake activities that are not paid for by the client? This is expressed by respondents:

Within that time period we'd have to fit in some research to a greater or lesser degree. It depends upon the client. Sometimes a client obviously won't be prepared to, or can't afford to pay, so we just have to. So we just have to fit in with that concept phase. What we generally do there is rely on friends and family network of low key research, just to make sure we're not missing the obvious. We try to speak to as many users as possible. I guess we're looking for that one thing, maybe two things that set it apart. Maybe it's just something that just gives it a little bit of an edge, you know, takes it out of the ordinary. (TT_02)

A lot of people just want phase one from us. They won't give us any project for phase zero and they want to just take a sketch and go at the end of phase one, and that's frustrating. It's tough but people are paying for creativity and if they don't have a lot of budget, that's the slot that they buy. We try and avoid those projects but depends how hungry you are. (IM_08)

Interviewees noted the need to become aware of the issues at hand before launching into design activities per se. The need to understand the starting point or context of a project is of prime importance to designers as it enables an understanding of the drivers and barriers implicit in any design activity.

One interviewee noted the formalised distinction between preparation projects, and execution projects. Preparation projects which involve a high degree of research in order to justify actually undertaking any design work are titled horizon two projects, while horizon one projects are very much more akin to traditional design projects which have a clearly defined end goal – in the form of a physical manifestation of a potential design solution.

Horizon One is how do we get it done, how do we get it out there? So that's pretty much the now and it's manage the teams. Horizon Two is what are the opportunities? what are the technologies that are coming, what is the market opportunities out there? We pretty clearly define them under those two levels and we have a relatively good transition between Horizon Two to Horizon One. (GM_09)

This more formalised approach, where projects need to go through a defined process from research (in horizon two) to design activity (in horizon one) is not shared across all sectors and organisations but is evident in interviews in a variety of forms. Here, there is value placed upon research activities that help to better define strategic direction. The context specificity of this approach is high and is often tailored to the particular organisational culture or personalities of the stakeholders.

The substantive factors associated with this theoretical category are denoted below:

Theoretical category	Substantive factors
Context/project specificity (4.3.2)	Approach not formulaic; specific to clients and project needs; methodological and team competency considerations; resource restraints; tailored process; non-linear process; end goal identified

Fig. 4.3.2 Substantive factors associated with the theoretical category 'Context/project specificity'

4.3.3 Theoretical category: **Consultation**

As previously noted (in sec. 4.3.1), consumers are often unable to articulate what they desire in the future as they cannot describe what they don't know. People cannot reliably imagine how they will use a new product thus their response to questions is likely to be unreliable. This position was confirmed by one interviewee who stated that when asked about what they'd like in the future:

Most people will say, I want what I've got now but just without something, or with something extra. (AR_10)

Another interviewee confirmed this problem stating consumers will only tell you what they're already aware of as a key challenge when researching the future with participants in the field. The respondent elaborates:

We also rely on a lot of consumer stuff but that's not to confuse it with the kind of slavish adherence that a lot of marketing led companies have to consumers giving them permission to do something, kind of crap. What shall we do in the future? Let's go and ask amongst consumers. All of that stuff is a bunk because Christ, I know if someone stopped me in the street and asked me about what I wanted, I don't know. I don't know!! I do this for a bloody living so I don't see how Joe Public is going to have a fucking clue. They don't. The point is there's all sorts of axioms, whether they be "people say what they mean" or "they don't mean what they say", or "they will only tell you what they're already aware of" so that they are genuinely incapable of seeing or articulating the future. Even if they could, they would find it very difficult to tell you in any meaningful way. (SR_08)

Designers have developed, and continue to develop, a wide range of research approaches that they used to illicit meaningful information from consumers and stakeholders to inform their creative activity. Often referred to as insights, the nature of information gathered, and the methods by which is gathered is multilayered involving an ever increasing set of actors. Insight is the goal of consumer research where a long-term perspective is needed to make truly valuable discoveries. An approach that considers consumers needs rather than wants is preferable where a process that breaks from traditional market research in that its main driver is the identification of coherent consumer insights; one that can be simply explained, holds up under scrutiny, and fits with other observations. As described by one respondent:

We've been very much looking at consumer behaviour, getting involved with doing focus groups, online blogs and bulletin boards, online groups, a real smorgasbord of methodologies to be honest. Also depths, we call them IDIs, Individual-Depth-Interviews, which sometimes are ethnographic in nature, and figuring out what their behaviour would be. The whole point was to try and understand which forum was the best forum to speak to their consumer and how. So that was very future-focussed, very kind of over the next five years, what do you need to do, where do you need to place yourselves as a brand for this consumer. (RH_02)

One interviewee noted the need to move from more traditional market research techniques, to approaches that identify consumer wants (from a predetermined set of options) to understanding what needs consumers have, specifically:

I think also there are different types of research and one of the things that I would to try and push is to get into the consumer insight. The consumer testing that we do, tends to be still of that very much of that, here's three options, which one do you like the best or which one feels best? I'd like to delve a little bit deeper into that to look into it even more from an at home observational research to help develop the briefs in the first place. So I think that by moving we don't just get handed a brief, it's like we actually help develop what that brief should be, and that's how I think we can also be more of a useful resource to them. (SHL_11)

Consumers and stakeholders are consulted utilising a range of predominately qualitative approaches, with the intent of identifying insight that can drive projects forward in a novel and creative way. These approaches are adopted from other fields, notably the social sciences, and adapted and augmented to support design endeavours. They are used to extend the decision base that judgements are made upon and to counter our own decision making bias, a bias that is often based upon our own culture, values, and experience. This was confirmed by respondents:

So on a micro level, in looking out it's basically spending time doing the interviews that IDEO does. Interviews, observations, this is really digging deep into the details of people's latent needs that you're only going to get at if you spend two hours with this person at home and ask a lot of questions, and then really dig out the details. You do stake-holder interviews. You basically identify the problem, the key stake-holders and speak to them about, what their everyday challenges are, what their goals are, what they are in a very micro immediate for their position, what problems do they have, to get inspiration from that. (PR_08)

The cultural specificity of consumer insight can provide insight that cannot be generalised upon and form the basis for a broad demographic. Again Salvador et al (1999) claim that design ethnography - which is based upon understanding what people do, what they say, and what they think - extends the cultural panorama and is helpful in identifying information and insight for the global marketplace. Design ethnography focuses upon the broad patterns of everyday life that are important and relevant specifically for the conception, design, and development of new products and services. The upsurge in the interest in, and adoption of, design ethnography over the last 10-15 years is in part

based upon the increasing accessibility made possible by the development in digital technologies such as digital still and video cameras. Respondents again echo this:

It's okay asking consumers what they think but you need to understand the cultural semisphere. What's informing people, how do people create the filters through which they're looking at this stuff? So even going one step back, not even speaking to the consumers, basically we thought that mix of methodologies, plus actually going out there and doing a bit of desk research, made a lot of sense to understand what trends were going on. So that sort of stuff, getting a sense of what's happening. (RH_05)

Design ethnography is not the only approach employed to consult with consumers. Some organisations do not have the physical resource or expertise to go out into the field and undertake extensive research. In these instances, organisations rely upon the awareness of their designers to augment more formal field research. One respondent observes:

We don't get out and about as much as we should. We always encourage certainly retail experiences or just people-watching. There's often very little luxury of time to do that. ... Sometimes you've got to be just watching people for a while, to notice where the opportunities are, to make things better. We really don't get a chance to go deep in an exploratory sense. (IM_02)

Organisations also undertake consultation with consumers that bring the field into the studio. This approach enables engagement with consumers in a structured manner without the expense (of time and resource) and can provide an alternative perspective to field research. This view is supported by the following respondent:

You could ask people to come in and design themselves. We have these things called unfocus groups, most designers hate focus groups and we call it unfocus group which means you bring in extreme users of something. If you want to design a chair, you'll bring in an orthopaedic surgeon or somebody who had back surgery or a massage therapist and tell them, Well what's your ideal chair? It's a beer and pizza as we do it in the evenings, and people just get foamcore and they build weird things but sometimes a completely unusual but insightful idea is in there. (TO_03)

The use of extreme users within research activities has increased over the last decade or so as a means of teasing out points of inspiration. Unfocus groups – groups that are made up of non-typical users - offer inspiration upon innovative design themes and concepts and demonstrate in a physical, tangible way what truly excites and drives people. The biggest difference between unfocus groups and traditional approaches is the engagement of extreme and exceptional people who bring their passions and interest. Unfocus groups mix elements of observation, prototyping, and brainstorming and aim to get inspiration from those extreme points.

The substantive factors associated with this theoretical category are denoted below:

Theoretical category	Substantive factors
Consultation (4.3.3)	Unable to articulate the future; in-depth-interviews, observation, and digging deep; consumer insight; finding context; non-designers designing – unfocus groups; project constraints preclude consumer and field research

Fig. 4.3.3 Substantive factors associated with the theoretical category 'Consultation'

4.3.4 Theoretical category: **Provide structure**

The information utilised in future oriented design activities is often referred to trends information, although there are many more types of information used. Trends information provides a catch all for information that is predominately related to change in society. One interviewee provided a considered description for trends:

A dynamic that is in some way impact or influence people and their behaviour and is generally, something that is present within the structure of society for some time. (LH_10)

The trends that matter are the trends that show how consumers are changing. There are many trends, some that show how consumers are changing, and some that do not. By considering trends as long-term changes in consumer attitudes and behaviours, there is the ability to link such changes to marketing opportunities. Yet, as one respondent reported, 'most people would talk about trends as being a demographic, psychographic, and economic shifts' (LH_10).

Whatever description is applied to trends, they are a well used concept within design activity and can provide structure for creative activities. One respondent elaborates:

We'll come up with a trend framework of opportunity areas for the client, and there will definitely be some level of tangible expressions of those opportunity areas. They could be sketches or they could be 3D models, they could be some kind of packaging point of sale, you know a figment of truth. What's the best way to convey those ideas often depends on the client because they all sort of need such different things. (JO_02).

Approaches that provide trend information in a manner that enhances understanding, provides structure, and conveys organised patterns were all noted as being of increasing importance by interviewees. These underlying structures enable the translation and analysis of data into meaningful, actionable knowledge. This is confirmed by the following respondent:

The output of that [trends research] needs some sort of framework for analysis, so what we often do is separate out outputs on a number of different levels, four main levels, really. The first one is fads, so fads we find are zero to two years and they're very fast moving. So we look at all the outputs and we try and determine if they're fads. We then look at trends. Trends are three to seven years, so they're longer term than fads and have a little bit more sustainability. Then beyond that there's movements, so we find movements are almost in a sort of seven to ten year range. Beyond that there are timeless truths. These are things that are more fundamental to the human condition, and don't

tend to change much over time. They remain fairly constant over the decade so that's almost a ten year plus timeframe. (LW_09)

This somewhat formal structuring of trend information into a series of categories was not evident across all interviewees, as many respondents termed all information that details change as trend information.

While some respondents utilise structured or semi-structured approaches to trend information, for example 'cards that are protocols. Each one is different, it's fairly flexible but it gives us some level of consistency when we talk to a lot of different customers' (GM_17), others employ a freer approach there they 'tend to find that if you keep it fairly loose, you get the same amount of information back as you would by trying to make it constrained' (RS_04). Where designers are involved in the collection of information for trends, it was noted that a less structures approach was more effective. Again this is echoed by respondents:

I think the interesting thing is, especially with designers, if they're going out to get this information is that if you constrain them too much, it kills their focus or their interest. It's one where you've got to just manage it to a point where it's fresh, it's lively, it's interesting and it's exciting for people, but at the same time, you're pulling the information back. (RS_04)

Well we haven't got any set template type thing that we use. (MK_06)

Structured approaches are employed in some instances drawing upon widely accepted analysis tools including SETP (social, technological, technological, and political), PESTLE (political, economic, societal, technological, legal, and environmental) and numerous variants. These analysis tools are employed to provide a mechanism to structure information into a coherent and digestible form. Respondents illustrate such approaches:

We'd be using a broad bandwidth scanning, so we'd be looking at societal, legislative, economic and technology trends and understanding that sweet spot where the client was going to be somewhere in the intersection between those things. And in many ways that's no different from a STEP process ... it's just that we're often twisting the thing slightly to satisfy the agenda, the brief, or whatever the client is trying to get. (SR_09)

So, the process of doing the trends is, Well, here are the big things out here that we know about, the PESTLE sort of analysis, but by going out and talking to people and looking at information, what everybody else is talking about, you create something that's got much more of a sort of an attitude, a behaviour, something more sort of inspiring if you like, piece of work. (LH_03)

The use of trends to provide future predictions was not supported by most of the respondents but their use in identifying and communicating patterns, attitudes, and behaviours was put highlighted. There was agreement that presenting trends such that clients can draw their own conclusions rather than dictating to clients was frequently used. Respondents elaborate:

I want to feel genuine in how I communicate what I've found, and so by claiming that there are going to be trends, I don't feel genuine doing that, but by saying, Hey, these are really interesting patterns that we see that aren't maybe mainstream yet but they could be, I would feel okay, positioning things that way. (JL_08)

Some trends have a bit more solidity and a bit more evidence and that's another important thing to lay out your examples of evidence, it's just these are some things we've noticed and we think they tie together kind of thing. We're not dictating, we're not saying that this is going to be the next thing, just have a look at these things that are happening right now and you can come to your own conclusion. (MK_11)

Clients are more than ever demanding evidence that back up claims and associations made in trends. The increase of the use of trends based information in design brought with it a level of cynicism. Due to today's exaggerated sense of uncertainty and foreboding about the future, forecasters have never been in greater demand yet and have never been less credible. Again respondents state

Trends is one of those things where we're finding the clients are demanding a lot more substantiation and explanations these days. Maybe five years ago they would have trusted a design consultancy or a designer to say, you know next year it's all going to be about red or whatever. There needs to be a lot more substantiation these days. (LW_09)

I think trend forecasting is different because that's when you're predicting when the trend is to come rather than looking at the trends that are already in operation. I think there are a lot of people who also bill themselves as trend forecasters who can say anything and they would still get paid a helluva lot of money to say whatever it is because no one can prove that or disprove a trend forecast. (JL_08)

Trends and foresight are about being prescient about the size and shape of tomorrow's opportunities by building an assumption base about the future based on deep insights into trends. In this context, strategy must be created from the future backwards, not the present forwards. One respondent elaborates on where to look for trends:

Look to what you haven't seen in a long time, and that is a better indicator of what's to come, rather than look at what's trendy right now because already it's too late. It's like the newspaper, when you're reading a newspaper, it's already old news so when you look at trends it's already too late. (JL_07)

This position implies that trends may be cyclic in nature and as such an understanding of trend cycles may assist in trend forecasting.

As trends can be nebulous or intangible, discussion can be beneficial during the research, analysis and translation process in establishing the relevance and potency of trends based information is understood. The following respondent observes:

Where we talk about trends work I think that in a lot of people's minds its quite an intangible thing. You talk about engineering or product design, it's a better understood process from which a more tangible, deliverable emerges. In terms of scoping and planning trends projects, I think that you've got to try and have a debate, a discussion up

front so that people can try and have their own input into how the process is finally put together, and quite often that's a very iterative process. (SB_02)

The use of trend based information in design provides creative fuel for the development process but the manner in which this information is presented needs careful consideration. Both design oriented communication, as well as client focussed communication, benefit from adoption of underlying structures to the organisation of this information. Frameworks, patterns, structures, and protocols provide a mechanism by which intangible trends information can be made to seem relevant, coherent and digestible. Clients may be involved throughout this process or at the briefing and presentation top and tail of projects yet need to buy-into the overall process of trends driven research. Without this buy-in, there is a tendency for clients to direct their energies onto the axiom that you can't prove or disprove a trend forecast – unless you are prepared to wait around until the timeframe of the forecast is here. The scepticism that surrounds trends needs to be considered and where possible evidence based methods employed to provide an underpinning structure to such activities.

The substantive factors associated with this theoretical category are denoted below:

Theoretical category	Substantive factors
Provide structure (4.3.4)	Frameworks, patterns, and structures; protocol, template, or free approach; PESTLE, STEP; debate and discussion; patterns, happenings, and evidence; substantiation; provide or disprove; figment of truth

Fig. 4.3.4 Substantive factors associated with the theoretical category 'Provide structure'

4.3.5 Theoretical category: *Problem setting*

The need to synthesise information from a variety of sources into a coherent form presents itself in future oriented projects where clarity of intent and specificity of purpose are required. By providing simplifications, abstractions or generalisations too often, the exact focus and scope of projects are lost. This said, clients may not be able to articulate this focus clearly and may need assistance in the problem setting of projects. Schön (1983) characterises this elusive process as problem setting rather than problem solving. Problems seldom present themselves in an orderly fashion rather they must be set. Activities associated with problem setting (or finding) activities are at the very heart of design. Again this is confirmed by respondents:

There's quite a lot of a that up-front conversation where I am involved so some of it is intuitive, you don't always get that as a black and white piece of paper, in fact the client may not even know themselves what the most powerful way forward is. (SB_01)

There's a huge amount of collaborative input from the client's side as this is really does rely on a huge amount of discussion and debate and interplay to get it right, because it's

very easy for it to be seen as wrong as well. If you look at it in the real cold light of day, there aren't any concrete absolutely correct answers. (SB_25)

The process of setting problems often requires a collaborative approach where all stakeholders – clients and the development team are involved. Often iterative, there are no clear approaches adopted by respondents. Respondents again echo this position:

Well, we do synthesis collaboratively. There's always these little sticky post-it notes on, messy, all over the place, I mean, you got different colours, different hand-writings, no order, it's mayhem. And, to try to find the system, means that everyone has their own system, I think that's cool. Everyone should have their own system, we should allow people to find their own ways with the mess. (JL_07)

We call it synthesising, it's the middle part, where things become very abstract so you've gone from this, they explain it in this curve from concrete to abstract at the top, and when you're doing the research it's still very concrete because it's real world. And then when we come back we download all the insights and thoughts and things that we've noticed and try to distil them into very abstract, we call it frameworks. Here you can build behaviours and patterns and that kind of thing around the problem or whatever it is that the brief's set around. (MK_02)

The translation of information from the concrete (data gathered from the field or desk based research) to the abstract (frameworks that assist in the development of creative activities) assists in problem setting as it provides a way to organise information into a coherent form. Previously, information may be from such a wide variety of sources, or levels of detail, that it is a challenge to see the wood for the trees. Synthesis of information, while time consuming, is an important stage in the overall research and development process. The process of problem setting relates to futures thinking as it provides a basis to develop visions of the future based upon past and present information. This draws together a variety of information relevant to future focussed activities even if it was not collected for such projects. By problem setting, a focus for the creation of visions of the future is established.

The substantive factors associated with this theoretical category are denoted below:

Theoretical category	Substantive factors
Problem setting (4.3.5)	Future unknown; discussion, debate and interplay; synthesising - from concrete to abstract

Fig. 4.3.5 Substantive factors associated with the theoretical category 'Problem setting'

4.3.6 Theoretical category: *Words and pictures*

The manner in which designers communicate both future oriented research, and creative reactions to that research, draws upon their communicative expertise. Designers are notoriously visually aware and sensitive people and often think directly by manipulating graphical information. The interplay between the two modes of communication, words

and pictures, provides designers with a robust means of communicating a wealth of information both clearly and concisely. Respondents illustrate this:

We'll definitely black and white it, we'll definitely have some sort of verbiage in there which will be the spine of the brief, but wherever possible, we'll communicate visually as well, whether it be physical samples or photographs or whatever. It's just, it's just how people's heads work really. (RS_10)

I explain it in words and pictures, and sometimes I bring things. (TO_07)

Although not always credited with strong engagement with (reading and) writing skills designers utilise the written word in a powerful manner when it is in support of their creative activities.

It's important to emphasise as well though that designers do use words. They might say something is very fluffy or plumptious so language is very important but again, it's just how you use it. (RS_10)

In the above case, the use of language draws upon metaphor to translate the written word into something that is useful to the designer. This approach has much to offer designers as it can act as a shorthand within communication and discussion within design teams. Metaphors help designers to understand unfamiliar design problems by juxtaposing them with known situations. One respondent supports this position:

It might be that you say to a designer, well, the feel I want is very Stella McCartney-esque, for example. That word will give them a lot of the information that they need but what they'll probably then do is they'll do more research and dip into what Stella McCartney's doing, and there'll be a dialogue that's visual and verbal from it. ... If you had to take one of those things away, the words or the pictures, in some ways I'd keep the words because you can always go back. It's like the Stella McCartney-esque thing, it's very much that they can go off and do their own research on that, but in some ways, in an ideal world you just want both really. (RS_11)

Although a number of ways that designers can communicate with clients are noted, some generic approaches are evident within the empirical research, extensively using an interplay of images and words. For example:

I think that there are a number of ways of doing it. A simple way which is the way that I've used a lot is a presentation board that brings that mindset to life. It describes them, it explains them. But then, also, might have some image examples, so I do it through imagery and words, and images that maybe show some of the products or brands that are appealing to them and I might have, if they want a little bit of data on it. So I might have a large piece of material that has, you know, an image, imagery, a little description, and also maybe a little bit of data on it and a couple of other images that reflect that sort of mindset, so it might be products they're buying into. (LH_04)

The ultimate intention of communication approaches employed by designers is to make the information understandable and actionable. This actionable element provides

translation of information into knowledge into activity. Without the communication phase, it would not be possible to put into place a series of actions that respond to insights embedded within the communication of information. The applied focus of these activities are conveyed by the following respondent:

We're not really in the business of producing a report that then isn't applied. Clients know and understand early on that there'd be little point in them doing that because the power is in the translation.(SB_13)

The use of images and words within communication elements of projects draws heavily upon designer's innate ability to translate often complex information into a digestible form. This activity may rely on their understanding of both 2 and 3 dimensions and the manner in which information is processed by the viewer. The use of visually engaging communication technologies, drawing heavily upon the interplay of words and pictures, supports future oriented design activities as it enables stakeholders to understand proposed visions of the future. In this activity, the future becomes specified such that dialogue with consumers about the future can be undertaken.

The substantive factors associated with this theoretical category are denoted below:

Theoretical category	Substantive factors
Words and pictures (4.3.6)	Visual and verbal; combination of images and words; metaphors in language; question marks

Fig. 4.3.6 Substantive factors associated with the theoretical category 'Words and pictures'

4.3.7 Summary

This section presented the research findings against RP03. There are some underlying approaches that the research has identified, namely use of frameworks (PESTLE, STEP) to assist in the organisation of research data; identification of patterns that assist in the understanding and communication of data; and the project specificity of approaches. The research has also identified a range of factors that impact upon this proposition including the difficulty found by the stakeholders to articulate the process utilised; the need for consultation with a range of stakeholders such as users, designers, and non-designers; the ability of designers to set problems as well as solve them; the power of creating future propositions to draw out opinion; and project and context specificity. Although a range of futures thinking approaches are evident, these are not necessarily formalised into an explicit process.

This proposition is generally not supported by the research findings as it is apparent that there are underlying approaches to the use of futures thinking in design. How these approaches are applied is less apparent and this was not explicitly or concisely communicated by respondents.

This section presents research findings relevant to this research proposition namely that *there are no commonly defined approaches to futures thinking in the design discipline*. The theoretical categories and substantive factors related to this proposition are denoted in figure 4.3.1:

Theoretical categories	Substantive factors
Process (4.3.1)	No formula, research is not fixed; constant change, flexibility, and adaption; difficult to define process; not rigorous, based on intuition; commonality within underlying process; levels and phases in research; structure, parallels, patterns, layers, array, and insights inform frameworks; adaptability to context
Context/project specificity (4.3.2)	Approach not formulaic; specific to clients and project needs; methodological and team competency considerations; resource restraints; tailored process; non-linear process; end goal identified
Consultation (4.3.3)	Unable to articulate the future; in-depth-interviews, observation, and digging deep; consumer insight; finding context; non-designers designing – unfocus groups; project constraints preclude consumer and field research
Provide structure (4.3.4)	Frameworks, patterns, and structures; protocol, template, or free approach; PESTLE, STEP; debate and discussion; patterns, happenings, and evidence; substantiation; provide or disprove; figment of truth
Problem setting (4.3.5)	Future unknown; discussion, debate and interplay; synthesising - from concrete to abstract
Words and pictures (4.3.6)	Visual and verbal; combination of images and words; metaphors in language; question marks

Fig. 4.3.7 Summary of empirically derived substantive factors and theoretical categories for the proposition 'There are no commonly accepted approaches to futures thinking in the design discipline'

4.4 Research Proposition 04: Designers appropriate futures thinking methods and techniques from other areas and augment them to support design activity

This section will discuss the characteristics of empirically derived categories representing the proposition *designers appropriate futures thinking methods and techniques from other areas and augment them to support design activity*.

Design organisations are engaging in a wide range of innovation and strategy activities that extend beyond the traditional design boundaries. This expansion of design’s vision means that these activities are taking design into areas that may not fit the traditional modes of engagement and consultancy models. Design-led futures is an example of such activities although the start of these processes is clear, the outcome of such activities may not be known from the outset. One respondent elaborates:

What I will say is that we are getting into programmes that have a lot of innovation and strategy attached to them. What that means is they're really programmes where the end-deliverables aren't clear at the beginning of the programme. That's actually quite new for a consultancy, I think, because when a consultancy, particularly one in design, is normally scoping a programme they're normally pretty clear on what those end-deliverables are. (LW_04)

One respondent elaborated upon the how ambiguous process is challenging existing consultancy models:

Within strategy type programmes that are grounded in consumer insights, technology, cultural trends, etc, what you're doing is really going through a very ambiguous process where you're really not sure what the outputs are going to be. They could be products, they could be services, or they could be a blend of the two. (LW_04)

What design organisations have developed is an ability 'to be able to address just about any need out there, and that's because we've added various services on throughout the years' (SB_18) and although project outcomes may vary design organisations have developed 'ways of prototyping those outputs, no matter what they would be, and clients are going to be able to see and, in some cases, experience what those outputs will be. So, we prototype just about anything' (LW_04).

In taking on just about any eventuality, design organisations may need to draw upon expertise beyond their own specialisms and capabilities, they strike partnerships with other agencies. This is again echoed by one respondent:

Where perhaps you may not have the 100% capability to be able to deliver, we'll certainly develop a strategic partnership with somebody who can help us to deliver that, but where we tend to be is right in the middle there making all of these things happen. (SB_18)

The specialisms design organisations draw upon, whether they are based within or from beyond their organisation, enable then to undertake complex and challenging projects – something that designers relish being involved in.

In terms of the nature of the projects that we get it's largely client-led, it's largely they come to us with a brief and then we'll tell them what we think they can do with it. So as long as we're still thinking about new methodologies, then we can keep putting them in there, keep offering them to the client and hopefully they'll bite sooner or later. But in some respects we can't create the work, if you follow me, we can't create work for a methodology that we think is brilliant. (RH_11)

Design draws upon a range of disciplines from beyond their own to develop new and novel research methodologies in order to address the challenges beyond design. The theoretical categories related to this proposition are denoted in figure 4.4:

Theoretical categories	
4.4.1	Adoption from other areas
4.4.2	Trends as trigger points
4.4.3	Bringing the outside in
4.4.4	Designers as researchers
4.4.5	Communication frameworks/mechanisms

Fig. 4.4 Summary of empirically derived substantive factors and theoretical categories representing the proposition 'Designers appropriate futures thinking methods and techniques from other areas and augment them to support design activity'

4.4.1 Theoretical category: *Adoption from other areas*

Designers adopt, adapt, and augment research methods from a variety of contexts to support future oriented design activities. Marketing provides a number of useful research techniques that designers employ to consider the future and most designers understand the nature of marketing. It can be claimed that there is a symbiotic relationship between marketing and design. This is echoed by respondents:

It's also about having learned quite a lot of the rigour of marketing and research that layers on top of what is generally a kind of innate, instinctive design ability. (SR_03)

A lot of our methods are mixed methods because obviously we rely on a lot of marketing methods, but, our end goal is literally to produce either data or support or whatever for designers. We're looking at whatever methods we use to create the design is our end result because that's who we're working towards. (AR_16)

We do a lot of market audit in competitive shopping out there for projects. (SHL_03)

Design adapts research approaches and tools to suit specific project needs and may challenge accepted concepts, such as the market segmentation model as outlined below, to ensure the appropriateness and relevance of these adaptations particularly where customer expectations are increasingly more demanding. Respondents concur:

It's looking at the margins of things really than looking at the centre. Businesses are often duped into thinking that the segmentation model is the answer and taking the top fifty percent of the model is where they're going to make their money when they're ignoring a lot of information that's outlying, that actually will move their products and services forward. So I think that's a difference that designers provide, is this looking at the margins and then being able to bring those margins into something that's meaningful for business, through prototyping, through testing, through visualisation. (RI_10)

We do qualitative stuff, mainly ethnography, but we also do things like segmentation, we do audits, sort of SWOT analyses of companies or markets, from a design perspective always, but trying to bring in, some of the rigour of marketing, rigour of research to that. Always though with a designer's eye. (SR_04)

The use of mixed-method research, often employing qualitative approaches, is core to the way designers approach research. For instance:

Depending on the nature of the project, we'll still be doing focus groups and there's quite a lot of feeling against focus groups particularly from design agencies, they don't like them, but they have their place. They're useful for getting through a lot of things quickly with a lot of people. (RH_12)

Respondents noted that although they may not feel marketing approaches are always an ideal research approach, they do value the effectiveness that these approaches bring, and as such employ them within design research. Often marketing research approaches underpin a designerly approach where designers adapt established approaches to suite the particular project. Ensuring that where research approaches have been developed, they are client facing and in a form that can be understood and used effectively. One respondent observes:

What we do try and do is create work and tools that are in an updateable format because the whole point is that you can re-visit this, maybe on a quarterly or annual basis, to check how things have moved on. (SB_13)

There are occasions that even when designers do not feel that marketing approaches suit a particular project, they may be the best (and only) research avenue open to them and as such employ such approaches within a larger study. For example:

They [clients] wanted to do an evaluation of their current range and competitor range so we had to do hall tests. That involved finding a space and sticking twenty appliances in it, which is not necessarily how we'd normally go about doing that sort of thing. So there's not really many other alternatives to doing that, when a client wants you to do just get a load of consumers to open and close doors and pull things apart, and what do they think of this product range etc, so that was a kind of obvious piece of methodology which we just had to stick in. (RH_05)

Designers do question the manner in which marketing approach research projects, particularly ones that consider more extended time horizons. The differences between the drivers that underpin the different disciplines in part colour the viewpoint of individuals.

We see it where marketing people will think about what is the future, they think well let's just push out the existing products in a different colour, and get an exclusive deal with a retailer. Whereas we're thinking, well maybe we need to reinvent the wheel really rather than go in ever decreasing circles, so we have seen evidence where we're thinking a bit more further ahead and wanting to push things further. (TT_13)

Design draws upon research approaches from disciplines beyond marketing and management driven domains. The field of social science provides a wealth of research techniques (such as psychology, anthropology, sociology, etc) for designers to be inspired by and use to augment design specific approaches. For example, the application

of semiotics within design has been growing in popularity, particularly where technology is opening up new and novel interaction paradigms. Respondents concur:

Although semiotics is an emergent methodology within our industry ... it offers almost a bit of science to this process. You can take it away from the customer for a second, from a consumer, from the user, from the target, you can take it away from them and deal in cultural absolutes almost. Where has culture gone? and where could it go? and where is this taking its inspiration from? ... I think a lot of clients turn away from semiotics because it feels a little bit out there, but at least in our organisation, it feel it's very much applied, but once you've got that application, you can start to give logic and reason to how consumers respond to stuff, and how they might respond to stuff. (RH_08)

One example of that would be the way in which we've got kind of semiotics working here, and I don't really think this is that evident in many of our competitors. Our designs have become more and more conversant in semiotics and we do have semiotics experts here that are very good at working with designers to make sense of some of the codes or discourses that they're reporting. (SB_14)

The use of semiotic analysis in future oriented projects allows designers to explore potential trajectories and provide an underpinning structure of potential meanings within future culture. This allows a semi-structured vision of the future to be developed.

Another area that provides design with research approaches that can be used as useful triggers within future oriented projects is film and cinematography. With the advent of affordable digital technologies, the use of such techniques have become available to creatives beyond this specialist and resource heavy field. Drawing upon these rich historical and methodological approaches, designers develop immersive communications that assist in the development and communication of creative solutions. Again respondents echo this:

We work with freelance movie makers and we make finished films which are stand-alone and might last anything from five minutes to half an hour. They have a narrative all of their own and they're really good at making a nice splash when you present something but it's not just about that, it's about how effective your findings are disseminated, how effectively they're disseminated ... It can be about bringing the target to life, it can be about bringing the future of the target to life, it can be about all sorts of things. (RH_12)

We got an illustrator in. We were given scripts, sometimes they've already written the scripts and you've kind of got to go with them, so we took the scripts, turned them into consumer friendly scripts. We said in this scene we want this to happen. He then illustrated it, then we took those out and we had a process where we sent them back to the clients, said, What do you think, is this working for you, is this how you envisaged it? ... We got to a situation where we had twenty five scenarios that we finished, worked up, we could put in front of consumers, and talk to them. (RH_14)

The use of moving image communication approaches has been adopted by numerous organisations including Philips, Samsung, Nokia, Vodaphone, and IDEO as a means of both communicating their creative thinking, as well as enabling feedback from potential customers and stakeholders. For example, Philips showcased new concepts that explored

the future of food on Second Life and YouTube as well as in exhibitions. Their intention was to elicit reaction and provoke discussion to further refine the ideas. The use of online research avenues is increasing dramatically and is being combined with more traditional approaches. One respondent observes:

The last stuff we were doing was we were analysing scenarios and we were building scenarios, so we had about thirty scenarios that we were showing people individually in home visits and online. So increasingly online is becoming an important methodology for us, it's becoming quite a typical part of many projects these days, and very much so when it involves exploring a target, which basically just means a consumer group. (RH_03)

With increasing access to information, the manner in which this volume of information is translated and communicated to stakeholders is placing increasing demands upon design as they are now called upon to become conversant with narrative and journalistic approaches.

It's really a very broad enquiry using all sorts of different techniques and individuals to bring a mass of information back and part of the challenge is in the organising that and then identifying what's out, what's in. It's journalism to a certain degree at that point. (SB_08)

The substantive factors associated with this theoretical category are denoted below:

Theoretical category	Substantive factors
Adoption from other areas (4.4.1)	Marketing approaches; mixed methods; qualitative methods; trends, market awareness, and competitor information; brands and sub-brands; semiotics; narratives, movies and scenarios

Fig. 4.4.1 Substantive factors associated with the theoretical category 'Adoption from other areas'

4.4.2 Theoretical category: **Trends as trigger points**

The term trends is used to cover a multitude of concepts that link to the future, within and beyond design, and are often used in relation to consumer attitudes and behaviours as well as broader environmental changes – political, environmental, social, and technological drivers. Recognition of patterns in attitudes, behaviours, and PEST drivers is only part of the value that trends bring to future oriented projects and the application of these patterns is of key importance. One respondent elaborates:

Trends is very much about seeing patterns and big picture movements, again with very much a design slant to it, but we're always trying to link back the manifestation of products back to a broader socio-economic and technological context. It's not just enough to say it's a trend and recognise it so it's to try and get underneath what bigger picture stuff is driving it. So it's to try and understand it a bit more rather than just simply spot it and give it a name. (SR_04)

This identification phase is a first step in engaging with trends in a meaningful way and applying them to your business. To harness the power of trends for commercial ends, a process of identification, interpretation, and implementation is required.

The manifestation of a trends in behaviour has been likened to an iceberg metaphor – what you can see is underpinned by much more deeper rooted trends that bubble up to the surface and manifest themselves in what people do. This is confirmed by the following respondent:

With trends, if they're real trends they don't actually change hugely, what changes is the manifestation of that trend, so the way that it is operating or the things that are being developed that connect in to that trend. So you'll see it getting deeper, richer, maybe changing a bit. (LH_07)

Understanding the context of trends and the resultant manifestation in attitudes, behaviour, and PEST drivers requires exploration of current perspectives in order to postulate future directions. Again this is confirmed by respondents:

It's about speaking to people, it's about observing everything from what's happening on the television, what are people reading, what magazines are they reading, so that you can understand the context. What that gives me is a current day perspective of the context. I think that you have to start from there anyway, whether you're thinking about trends. (LH_02)

We're trying to reach out and meet traditional forecasting, and research and analysis, but bring it down very much to conclusions for the client once we've gone through all these things. We would want to, for example, plot trends in terms of influence over a timeline and we would want to bring that down to conclusions for the client. (SR_09)

Primary research is combined with broad secondary research and synthesised into possible trend manifestations. As many organisation now have access to a broad range of data, often in the form of trend analysis data supplied by specialist organisations, the translation of interpretation of this data is of increasing importance. Organisations such as FutureLab, WGSN, Trend Watching, Stylesignal, or Trend Hunter provide trend analysis data where patterns or trends have already been identified for a variety of applications. Respondents noted the need to provide their own point of view upon trends ensuring that the relevance for clients is highlighted. This process involves distilling a broad range of information into a framework that enables clients to apply the trend information within their business activity, or as one interviewee noted create 'tangible statements of what these trends mean to that specific brand or company' (SB_04). Respondents echo this position:

We'll also look in the trend websites, magazines, internet, a full gamut of wherever you can pull information from, but we will put our own interpretation on that information. We won't just necessarily pull the information off WGSN and say that's what they're telling us so it's right. We'll put our own interpretation on that which again I think is very

important because it gives you your own product approach and suggestions, individuality and relevance. (RS_03)

Certainly for a bigger client, we'll try and distil the trends into blocks of maybe three or four really tangible things that we think are influential, not only from the clients' point of view but the type of product we want to generate for them. We're using them almost like pegs to hang the product on so you end up with some real tangible information that will distil into actual product and into the design in the way that we design it. (RS_05)

A multitude of communication approaches are employed. One interviewee observes:

People usually need a clear statement and we've developed lots of different ways of doing this, but a simple example is a physical model that demonstrates what that is tangibly, and that's what really clarifies the implications of trends for people. (SB_04)

Trend drivers may coincide and provide patterns that can be combined to provide rich supporting data and evidence for trends. The conflation of a number of trends may result in a range of hitherto previously unlikely possibilities. This is supported by the following respondents observations:

Sometimes there's complimentarity between certain trends. There might be an emerging behaviour and there may be a technology coming through that's going to enable the delivery of a product. (SB_07)

The substantive factors associated with this theoretical category are denoted below:

Theoretical category	Substantive factors
Trends as trigger points (4.4.2)	Patterns and movements; current day (consumer) perspective; trend manifestations; interpretation of trends; tangible statements

Fig. 4.4.2 Substantive factors associated with the theoretical category 'Trends as trigger points'

4.4.3 Theoretical category: *Bringing the outside in*

The design process benefits greatly from a clear understanding of project centred issues, particularly when they are in the form of real world perspectives, critical challenges, and stakeholder needs, wants and desires. These issues may need to be identified in the field and consciously brought into the design sphere. This process normally requires a combination of primary and secondary research activities which is often conducted in a number of ways. Although this process is relatively new to design, in a formal sense, it has been in associated disciplines for much longer with one interviewee noting 'bringing the consumer perspective into the agency as a discipline has been established in advertising agencies, since the very early eighties' (LH_01).

Consumer perspectives are only one form of outside issues that are used to inform the design activity and often the broader socio-cultural landscape is used to augment specific

perspectives. 'I think though, there's a difference between bringing the consumer perspective to advertising development, versus bringing a broader perspective of the trends to clients and their business' (LH_01).

The designer as inquirer has become increasingly important in contemporary design practice. One interviewee characterised this below:

You have to be very nose-y, you just want to know everything, you want to know about going on in people's lives, you want to know why they're doing this and why they're doing that, and why is this happening and why is that happening, just very nose-y, really you just want to sort of stick your nose into everything. (LH_12)

Where designers are inquisitive and interested in understanding the experiences and viewpoints of stakeholders, they transfer this propensity across the development process. This will include team members but also may encompass clients. One way in which they develop a shared language that can be used to fuel dialogue throughout the project is immersion tours. This experiential approach takes designers and project stakeholders into a space that is of importance to a project such, as retail environments, to develop a shared understanding of the key issues impacting upon a particular project. The following respondent elaborates:

Immersion tours are really designed to immerse both the design team and the client in the culture of wherever we're looking. We get the client out with us on tours of particular sites in different cities around the world. We teach them to look through new observational lenses and see things and start making connections that they previously wouldn't make, so a lot of it is about heightening that sensitivity really. It's a little bit like if we're in a soccer stadium and I say we're going pick out everybody who's wearing a yellow top. All of a sudden your mind is sensitised to people only wearing yellow so you start to see them everywhere. ... when you're doing trend research, a lot of it's about sensitivity, sensitising the mind to seeing new patterns, and that's what these immersion tours is designed to do. (LW_09)

Sensitising the mind to a particular issue, be it physical (such as the layout of a retail space), or experiential (the feeling of being within a particular retail space), is not always deemed to be relevant at the actual time of immersion. There may need to be some reflection or facilitated interrogation of the issues experienced during the immersion tour as the following outlines:

These two days for them (Korean clients visiting the US) felt really boring, and it was like, What the hell do they drag me through all these stores? Then we actually spent only two hours the following day chatting about it, and then as everyone had taken pictures we put them up, and there, all of a sudden, we connected dots. We said, Oh, that's interesting, they did it in this manner and that was similar and that, but in a very different dimension and a very different level, there's an interesting pattern here and that's what they tap into and nobody else does and so that could be interesting for you. All of a sudden, connecting all those dots, they were amazed by it. As we were dragging them through the stores, they didn't see anything. (PR_10)

A number of organisations such as Bespoke Tokyo (Safaris), MirrorMirror (Trend Surveillance and Navigation Tours), Cscout (Trend Tours), and W.ing Research (Trend Tours) offer immersion tours and creative facilitation of trends identification. This is in line with issues discussed in sec.4.5. These expeditions allow participants to experience and discuss trends first hand and on location, visit innovative companies, meet experts and trendsetters.

Immergence in projects takes many forms and does not necessarily include visits to retail environments for example. Projects often require an immergence phase where client research and knowledge is tapped into and taken on board by project stakeholders. One respondent observes:

Part of our immergence phase will be us synthesising client's research within our process, as well as doing some of our own primary research. Our own ethnography or whatever other techniques that we see necessary. (LW_07)

Client research provides a broad viewpoint that has potentially been collected over an extended period and complements design based research undertaken specifically as part of the orientation phase of projects.

We find our clients research is often very complementary to the research activities that we would conduct. They tend to go broader and much more segmentation and really finding out where to look and then, our research is research that's designed to really get to the user experience so we do smaller sample sizes but we go much deeper with the people that we do go and interview and observe. So we're yielding much more rich, more nuanced, deeper, more textured information than our clients will have got from their more broader market research activities. (LW_07)

The combination of client based research and project specific design research, be it primary or secondary research, requires the understanding of existing research and identification of suitable strategy for design research to address. The main focus of this activity is to understand what issues can be used to drive and shape creative activity. Research helps to get a better understanding of people – their needs, desires, habits and perceptions. This is confirmed by the following respondent:

Generally we'll have a phase in projects called familiarisation and creative vision and it's basically about having inductions with different people from products, sales, marketing, all the rest of it, and then looking at all of the research they've already commissioned, and distilling all of that down into maybe five or six guiding principles that the design has to affect. We often describe it as a funnel, everything going down to the design. (KS_19)

Ownership of primary design research was noted by one interviewee where the need to undertake research rather than drawing upon research undertaken by a third party was identified.

What we try to do is to keep it, where possible, so we've got our own hands on it as much as possible rather than just pulling the information out from other sources, which is good because it keeps it real and keeps it very focused. (RS_03)

Engagement with primary research provides external perspectives and balances bias – where bias within interpretation of findings can skew research data. As many researchers have put forward, personal bias, in the form of moral, generational, cultural or gender bias must be avoided within the research process. One interviewee noted that:

You're in a situation where you've got different opinions because people have visited with different customers and things can get directed heavily one direction, because you've got an opinionated VP who went to Wal-Mart and saw this, and so it drives it this way' (GM_08).

Designers employ research methods that attempt to negate or limit bias by drawing information directly from stakeholders and documenting it in such a way that it doesn't contain assumptive or reported bias. Such methods including ethnography, expert panels, and focus groups are all evident in future oriented design projects. Respondents conform this position:

We have video evidence where we might have gone into people's homes at some points and actually, observe them in their daily use of that current product in order to eke out some attributes. If you ask somebody a question and they'll say one thing, whereas if you use video cameras and watch them, you see something completely different. That element is very important but all those others are equally important, I mean looking at competition, looking online, benchmarking the competition. It's all important. (TT_07)

We have a big network of experts which we really tap into and they're kind of specialist experts, so they're people who are really focussed on particular areas. We can call them and say Okay, we're doing a project, can you come and bring some stuff and they'll work with us. (AR_03)

You often find out a lot of negatives from focus groups which are really good for our work but you do get the odd wish list. It's a good starting point and once we start then doing trend data, then we can work out from the focus groups and from the trend data what we can take on board and mix it. (AR_10)

Designers are able to connect information from a variety of data sources and are master recombinators, taking a bit of this and a bit of that to form something completely new. One interviewee noted that:

You might be designing a telephone but there might be something, some new fabric that's great. It could be unrelated but useful. That's the hot spot, when something's unrelated and you can see a new application, that's brilliant if you can make that link' (TT_07).

The ability to synthesise seemingly disparate information and give it some kind of form creates something to pass around, and to build upon, and rally round. This synthesis

enables a point of view to be developed in the formative stages of projects. The following respondents echoes this:

We have put together these presentations that we have once in a while called point of views where people share a point of view on something. It could be anything but generally kind of design related which is quite a nice way of presenting something you've noticed. (MK_05)

In some instances, this point of view can be based upon limited research undertaken by the design team and may be in conflict with existing research. It acts as a discussion point that triggers a dialogue that may inform further research, specifically:

A big part of what we give people at the end of phase zero is what we call a point of view. And that point of view is anecdotal, intuitive, no research on our part, no formal research it might be lightweight cruising the malls, or cruising the web, and then we'll play it back and see. Here's our point of view, this is what we think you should do strategically. It may be at odds with the information we got to start with or it may complement, but it'll never be exactly the same. We do like to put out a point of view and just say, you know what, we don't really understand this space but here's how we think you should tackle it or, we know this space sideways, you don't stand a chance, you should do something else now. So we always start with a point of view. (IM_07)

Many of the approaches designers utilise to undertake design research draw in information from outside the design space into the project. Methods vary greatly yet often rely upon designerly approaches to translate the data into actionable knowledge that can underpin and open up thinking. Much of this work is at the formative stages of projects where commitment to approach problems in new and novel ways may be evident. Designers can demonstrate a level of commitment that most people aren't willing or able to make when it comes to bringing a young idea into the world.

The substantive factors associated with this theoretical category are denoted below:

Theoretical category	Substantive factors
Bringing the outside in (4.4.3)	Bringing the consumer perspective in; immersion tours and analogous visits; client vs. own research; video ethnography; expert panels and focus groups; pov; unrelated but useful; bias

Fig. 4.4.3 Substantive factors associated with the theoretical category 'Bringing the outside in'

4.4.4 Theoretical category: *Designers as researchers*

Designers undertaking research is now maturing as an area of study and in recent years we have begun to understand more about this process. Effective design research is concerned with synthesis, recognition, empathy, exploration and interpretation.

Designers are increasingly undertaking research, particularly at the early stages of projects, that drawn upon approaches from beyond the traditionally identified domains of design. Designers are extending their circle of interest and drawing upon a range of non-design research techniques that enable them to undertake futures research of use and value to design. They, as one interviewee noted are becoming 'the facilitators of the customer knowledge' (GM_09) and empowering designers to lead research that would have traditionally been undertaken outside of the design domain. Respondent GM elaborates:

When we do design research we bring the industrial designer, and sometimes the engineer along, so that there is an ownership of the research, and as a project goes on, it might even be the industrial designer who is running the research because we've already set the protocol, we've already set up the visits, and it doesn't necessarily at some point have to be even the researcher who's running the actual research. (GM_09)

This empowerment of designers as researchers is manifest in design pushing to be involved in research where hitherto this was seen as the domain of marketing or R&D. As one respondent observes:

We always try and push it to get a designer involved in focus or research groups because they can ask the right questions at the right time and just push in the right direction. (TT_18)

Designers are increasingly becoming confident in being in the position of driving research programmes and ensuring that research that is commissioned will ultimately be of value to the creative process. Interviewees noted that before design became involved in formative research activities, 'the chances to influence the direction of the product were a lot less' (GM_07) and have increasingly 'gotten ourselves in front of defining the product that's going to be developed' (GM_07).

This does not mean that designers are now the sole arbiters of research that informs design and development programmes. Designers may be involved in a particular aspect of a larger research project that utilises expertise from various domains and may not lead this particular activity. For example:

If a designer's going to do research on a project, it would be a week maximum. So if we're going to do ethnographic research, then we'll do it as a proper study. It would be a three month study and that's why we've got user researchers, experience researchers to give the different kind of skill sets. So the bit that we're adding is the translation of that information for design. (AR_16)

As an inherently creative process design, designers engage with research process from many cognate areas and combine these rigorous research process with intuitive and design centric approaches. Respondent SR elaborates:

Designers do what they do mainly because they were drawn to it instinctively, but the future lies in rigorously learning a lot of clever technique and standing on the shoulders of giants. The combination of the best of the rigour and the best of the chaotic, creative and inspirational, the other, the non-logical, the non-linear, the creative leap. Basically the rigorous and the creative, the combination of those two is incredibly powerful, but only when one stands on the shoulders of something else, and not vice versa. (SR_20)

To stand on the shoulders of giants, designers need to engage with appropriate disciplines and synthesise this expertise into their working practices. Designers have been an enthusiastic group of amateur researchers who incorporate human centered principles into their activities. Over the past twenty-five years design has integrated professional researchers into their practice such as anthropologists, psychologists, statisticians, and market researchers. When commenting upon the backgrounds of design and development team member, one respondent stated:

She's a design anthropologist and a clinical psychologist, and she is very well suited to gathering that kind of information and it is observational and the ethnographic component of it is very important. Understanding the intended users and user groups, and sometimes the unintended ones, always give you a lot of insight into whatever problem that you're trying to solve. Designers often kind of rely on their own instincts to solve problems and that's a mistake I think. It's a serious error. You've got to look at who the audience is, who the people are that are the intended users are going to be and try and look at things from their perspective. That idea of empathy is very important, having empathy for users. You have to design for people that are non-expert and don't know how to use a particular item, system or whatever. (RI_06)

Such work anchors the constraints of design in the realm of human experience, yet much of this work is located at a turbulent and strategic intersection of worlds and sensibilities. Design and research are becoming interchangeable much in the same way as the boundaries between design disciplines have been blurred.

Design organisations that engage with research have begun to employ non-design specialists or designers with additional skills not normally recognised as design specific skills. Akin to concept of T-shaped people - individuals who have a depth in a specific discipline but a breadth and empathy across disciplines - can send shock waves through an organisation as they bring big ideas from the outside. The number of specialisms employed and offered by design organisations continues to grow. This is echoed by respondents:

That's one of the kind of employment policies of this company is to employ people from different backgrounds, so we have people from anthropology backgrounds, we have people who are trained psychologists, we have people from a full spectrum of disciplines, and it's through having this resource which I think allows you to keep innovating and spreading and not spread yourself too thin. We've never yet had a situation where we can't staff a project or we've had to put the wrong kinds of people on a project. (RH_12)

We purposely work in many different areas because I think that you do get a lot of cross fertilisation of ideas and also that I think that one of the most important things that a

designer can do, this comes down to an interrogation aspect, is to ask that question, why do you have to do it that way? (SHL_16)

The ability to work and research across disciplines as well as questioning accepted norms and ways of doing things provides design with a powerful tool to fulfil the increasing need to provide systematic study as a path to innovation, consequently creating opportunities for those who claim to innovate systematically, methodologically and on demand.

Decisions in today’s design process are explicitly or latently influenced by complex modes of cooperation between people who don’t necessarily have much in common apart from working on the same project. This was highlighted by respondent SB:

Designers aren’t typically great at writing, aren’t great at articulating why something is the way it is. Whereas the trends people are really great at saying why something is the way it is, but they’re not able to design it. That’s where the two meet. (SB_25)

Researchers can influence that direction the development of a product takes just as much as designers can. The boundaries are blurring between design and research within and beyond the domain of design.

The substantive factors associated with this theoretical category are denoted below:

Theoretical category	Substantive factors
Designers as researchers (4.4.4)	Facilitators of research; understand appropriate stimulus; standing on the shoulders of giants; others working in design; diversity of client base; synergy with other disciplines

Fig. 4.4.4 Substantive factors associated with the theoretical category 'Designers as researchers'

4.4.5 Theoretical category: *Communication frameworks/mechanisms*

Communication from design activity, be it design research, provocations or concepts, developmental work, or final proposals, relies upon a multitude of methods to convey this thinking to stakeholders. Access to elements of research or developmental work is particularly challenging when project teams are broadly distributed or particularly large where fragmentation is possible. In addition, research amassed over a period of time by a number of individuals or organisation present challenges to design teams as often a limited resource is available to review, prioritise, and synthesise such information. Organisations have developed a range of communication mechanisms that involve databases, web portals, frameworks, mappings, roadmaps, and platforms that assist it the management and communication of design and design research data.

The advent of digital technologies has opened up a range of potentially supportive ways of dealing with a large amount of information. This may be at the formative or

summative stages of projects and vary in the application of method or participants involved. Where large amounts of information are involved, databases and portals with infinitely searchable approaches are adopted. Respondents concur:

We've amassed a database that has up to 150 trip reports and over 500 photos and videos. This database allows us to communicate with engineering and design on what are the business processes. It's a searchable database so you can put in a product name and it'll tell you every customer that's using that product and how they use it. There's tag clouds in it so you can put in delivery and it'll give you trip reports that are related to delivery and so you can study about delivery from the customers. So, as much as possible, it tries to bring the customer's business process to the design and engineering team. (GM_02)

The ability to make research visible and accessible within an organisation is essential to effective communication. One interviewee noted 'our database is a great way of sort of organising our research and it becomes visibly the organisational knowledge which was often lost as the researcher left the company. So this has become a tremendous asset for the company, as it builds it becomes even more valuable' (GM_15). The process of gathering information to enter into databases or bespoke storage solutions required the collection of data in a suitable format. In light of such requirements, one interviewee stated that when visiting exhibitions:

We're collecting information, we're scouting. We have scouting sheets so people are briefed before they attend these things so they can come back armed with information that we can then bank. (SB_20)

These scouting sheets or visit reports can then be used to translate information into the correct format and provide it in a usable form. Such processes can enable stakeholders to access directly or consult with experts with regard to the most suitable areas for consideration. In essence these knowledge management systems assist designers and researchers to collate, organise, and present data from a wide variety of sources in a coherent and concise manner.

We also have a referencing system so a lot of the sources that we're using and constantly tracking are banked and they exist in a place that people can come and access. (SB_21)

Communication of research and design data to clients presents a different set of challenges as the level of expertise beyond the core development team cannot be assessed and controlled in such a manageable way. Additionally, clients may not be interested in all aspects of some research findings for example. They may wish to access specific examples pertinent to their role and particular demands at any one time. Online portals or websites provide remote access to a wealth of updatable information that can be customised to meet the needs of particular clients, organisations and sectors. One respondent elaborates:

We're also producing websites which bring together a whole new level of interactivity. Websites are really fantastic at is if you've got a huge project with an awful lot of information serving a very broad disciplined client team, you can allow the client, each individual member to go in and get the stuff they need to without having to go through everything. It's just a very efficient and effective way of ordering what you've found out. So we're producing something at the moment which has for example, a load of vox pops, it's got about fifty articles on it, it's something that we produce every six months as a kind of broad take-out for all our clients. But the way it's organised allows you to engage with the kinds of information that you're really interested in. (RH_13)

Interactivity and the ability to tailor information to a specified audience enables the use and reuse of information for different audiences, requirements and budgets. These approaches are not owned by design and can be drawn from a range of cognate disciplines. Where design is able to bring value is in the presentation and translation of this information, via the use of visual approaches to ensure that an appropriate and coherent message is conveyed. This visual sensitivity enables creative mapping and visualisations; in the form of such things as bubble comparisons, polar grids, infographics, charticles, matrices, icicle pies, and bubble starring; to segment information into manageable chunks. The use of visual approaches is outlined by the following respondent:

Stuff we do is visual, for example this is a big thing we got up on the wall but it's, it's basically a timeline of a product, so it's a big map on the wall. But we have done this all the time and really, all it's doing is helping us see a shift in the manifestation of things. It's a nice pretty thing to put up on the wall as well, and it's very helpful when you're referring back to things and going, So, when was that, and why, bur bur, you know. It's just a good way of understanding how it all fits together. We tend to try and make things as visual as possible because there is a certain understanding of the issues when you can visualise it more. (SR_09)

Visualisation enables a shared understanding of issues to develop within project teams. Where visualisation is used to externalise underpinning frameworks or structures that have been used to strategically direct projects, this enables a check to be put in place that ensures creative deviation from established points is limited, a point echoed by respondent SB:

What you need to do is constantly reference the framework to make sure that just as in the same way as you want to go back to source and understand where those drivers were and how you connected them, moving forward you want to make sure that you're staying true to that framework and not just using it as a license to go crazy. (SB_15)

Visualisation of frameworks, used within research and development phases or latterly communication phases, provides design with a stake hold in the overall development process. Designer's inherent visualisation abilities can assist in the formation and creation of tangible concepts that can be observed and used to illicit responses to.

The substantive factors associated with this theoretical category are denoted below:

Theoretical category	Substantive factors
Communication frameworks/mechanisms (4.4.5)	Searchable database; tracking information; scouting sheets; roadmaps, frameworks, and platforms; interactive communication; pov; visual mapping

Fig. 4.4.5 Substantive factors associated with the theoretical category 'Communication frameworks/mechanisms'

4.4.6 Summary

This section has discussed the proposition 'Designers appropriate futures thinking methods and techniques from other areas and augment them to support design activity' and it can be seen that empirical evidence supports this proposition. Relevant factors to the efficacy of this proposition include use of marketing approaches such as brands and semiotics; the use of approaches from the field of film making and cinematography; identification of use of trends to inform research undertakings; the value of the consumer perspective within the research process; the integration of client based research to inform design activities; designers as researchers; and the use and development of communication frameworks and mechanisms within future oriented design undertakings.

This section has presented research findings that on the whole support this research proposition, namely that designers appropriate futures thinking methods and techniques from other areas and augment them to support design activity. The theoretical categories and substantive factors related to this proposition are denoted in figure 4.4.1:

Theoretical categories	Substantive factors
Adoption from other areas (4.4.1)	Marketing approaches; mixed methods; qualitative methods; trends, market awareness, and competitor information; brands and sub-brands; semiotics; narratives, movies and scenarios
Trends as trigger points (4.4.2)	Patterns and movements; current day (consumer) perspective; trend manifestations; interpretation of trends; tangible statements
Bringing the outside in (4.4.3)	Bringing the consumer perspective in; immersion tours and analogous visits; client vs. own research; video ethnography; expert panels and focus groups; pov; unrelated but useful; bias
Designers as researchers (4.4.4)	Facilitators of research; understand appropriate stimulus; standing on the shoulders of giants; others working in design; diversity of client base; synergy with other disciplines
Communication frameworks/mechanisms (4.4.5)	Searchable database; tracking information; scouting sheets; roadmaps, frameworks, and platforms; interactive communication; point of view; visual mapping

Fig. 4.4.6 Summary of empirically derived substantive factors and theoretical categories representing the proposition 'Designers appropriate futures thinking methods and techniques from other areas and augment them to support design activity'

4.5 Research Proposition 05: External agencies provide future based knowledge for designing

This section presents research findings against the above research proposition (RP05). The diversification and specialisation of design organisations in recent years has resulted in the use of highly specialised partner agencies with whom design organisations engage with to ensure appropriate coverage upon projects. These may include specialists in anthropology, psychology, demographics, organisational behaviour, or even business analytics. Many disciplines become involved in innovation activities which involves conceiving, selecting, and implementing ideas that are possible technologically, viable for business, and desired by customers. The up-streaming of design has resulted in organisations needing to fill skill and knowledge gaps particularly where projects require strategic coverage.

Design organisations draw upon the specialist expertise of external agencies to provide a comprehensive service to and for clients. Additionally, engagement with client-side research has become even more important as the exchange of knowledge provides an opportunity for synergetic development programmes.

The theoretical categories related to this proposition are denoted in figure 4.5:

Theoretical categories
4.5.1 Client based knowledge
4.5.2 External agency driven knowledge
4.5.3 Information flow within projects
4.5.4 Expertise within design - team based approach
4.5.5 Visually driven communication strategies

Fig. 4.5 Summary of empirically derived theoretical categories for the proposition 'External agencies provide future based knowledge for designing'

4.5.1 Theoretical category: *Client based knowledge*

Clients undertake and commission a variety of research to ensure that they are informed and able to make evidence based decisions. The nature of this research varies greatly between organisations and is particularly driven by the sector of operation, size of organisation, and strategic trajectory. When engaged in a development project, design organisations are not 'looking to duplicate some of the services or knowledge that they have or that reside in-house' (SB_01) and seek to 'speak to stakeholders within the client company to make sure we've got hold of any relevant perspectives from previous research as you don't want to be repeating stuff' (RH_07).

The balance between drawing upon previous research and bringing something new to the project requires design organisation to review and draw out relevant observations yet providing a fresh perspective. The external perspective that design organisation can

provide may be one of the reasons why clients use constancies as they are not inhibited by internal issues. Respondents elaborate upon client based research:

We find our clients research is often very complementary to the research activities that we would conduct, so we don't generally treat it the same, because it's just different forms of input, but they're normally coming to us because we specialise in design research, as opposed to market research, which is normally where their more traditional competencies lie. (LW_07)

Sometimes people will give us a big fat tome of market research and say, Make sense of this, and other people will kind of call us up and say, We need to be doing something different next year, you know us, what do you think we should be doing? It's like going to see your doctor; he knows how you should change your lifestyle more than you do. Sometimes that external opinion is truly valuable so that's a lot of what we put to people. (IM_02)

The lack of imagination to see beyond initial findings of research can reduce the potential clients see within both the research and development projects that may follow from the research. Respondents confirm this position below and discuss their role in this process:

Often the clients have usually amassed an enormous amount of information themselves, but what they may lack is the imagination to see beyond. A lot of the information is resident within the clients themselves; it's just a question of drawing it out. We have various processes where we draw that out through inclusive participatory events and workshops and things like that, that get stuff out. We also try to be fairly good and do a certain amount of diligence at the beginning of projects to get all the information they have. (SR_07)

Clients are often a lot more knowledgeable about the market than we are, we're not experts but they are. I think it's interesting you can almost use their breadth of knowledge in the market and that as inspiration, but again, I think you almost have to take it with a pinch of salt because sometimes you want to try and step out of that because they become very narrow-minded and saturated with what's going on in their own little world. They don't see what could be, they don't really realise that things could maybe be an inspiration for that product or something like that. (MK_04)

Before design is able to provide strategic inspiration based upon completed and historical research, an understanding of the content, value, and potential contained within the research is required. This immersion process can reveal pertinent insights that may not have been identified previously, as one interviewee asserted 'we might arrive to a completely different conclusion because our criteria are different' (TT_08). Research information may need to be synthesised and translated into a form that is appropriate for design to assimilate and act upon. The translation is client based research is discussed by respondents below:

Principles was a brilliant example, they literally had a chest of research that they'd commissioned over the last probably ten years, and I had to go down and spend a really horrible day literally going through everything they were showing me. Going through that and distilling the key points so actually making use of everything they've already

commissioned but then, translating it into a design brief so that all of that's not lost. Clients love that. As much as it can be about commissioning new, it's also about making use of things that they've already spent money on in the past but it's probably just been sitting gathering dust. (KS_19)

We often analyse secondary research that has been completed by our clients. So they may have used different research firms to conduct different qualitative or quantitative research, but part of our immersion phase will be us synthesising that research within our process. (LW_07)

A danger of utilising a mass of data aggregated from a variety of sources is the lack of cohesion within the data. The reason for undertaking a particular element of research will shape the manner in which data is collected, analysed, and communicated. Ensuring relevance to the target audience may result in the focus and narrative used within the communication of the research, result in a particular theme or issue being highlighted or marginalised. The individual or team responsible for the production of a particular element of research will make editorial decisions that may not be apparent after the event. The need to take research with a pinch of salt was noted by a number of respondents.

I mean, that's one dimension, that's one person's set of opinions. A marketing document may be aggregated from many, many sources and then edited by one person and their opinions will be filtering everybody else's opinions and then giving you a boiled down version. We certainly take that in. But that's not gospel from there, that's just a starting opinion, so we like to look at it ourselves. (IM_07)

I think that you have to respect what they're telling you, you also have to take a little bit of it with a pinch of salt. I think that the problem is I've been in enough testing sessions and you can really pull out the wrong information from people. (SHL_08)

Reports are good because they bring you up to speed and you've got something you can refer back to, and you can just read through it and it's great, but it's depending on what the research is. Focus groups and videos they're really good cos you can actually see someone and instantly empathise with them and understand what they're doing or not doing and gets thing right, but the problem is, is that are they edited together, aren't they edited together, what's been missed out, what's not been put in there? (TT_09)

Understanding research priorities is an important factor in long term relations between design organisations and clients. Design organisations engage with client by creating a dialogue around ongoing and future research. Where good working relations have been established (often over an extended period and across a number of projects), opportunities to inform, and be informed by, research activities exist. One interviewee stated:

Assessing something's success after it's been done is important as well. Is it working? What research are you commissioning? Could you commission that type of research instead? (KS_17)

The ability to draw upon the power and reach of a large organisation who are clients opens up research opportunities that hitherto may have not been considered possible. Where design organisation have specialist knowledge and are able to draw upon a broad network of associates, large organisations can wield the power of their relationship with their supply chain, the breadth of touch points their brand has, and facilitate information transfer within their innovation pipeline. One respondent observed:

There are research issues that we probably don't have the power or the leverage to get. Someone like BT can ask questions and get answers back to them from large numbers of people where we'd probably be hard-pressed to do, so there are occasions when we'll get a document, like market research, competitor research, the numbers they may have got from a manufacturer, there are things that they can get that we can't. (TT_09)

The need for design organisation to be aware of the potential such approaches provide, and the insight that can be gained from access to this data rich research, creates strong bonds between stakeholders. One interviewee noted that when research is provided by clients it should be valued, specifically:

If it's specific to the client, you've got to be very close to it. Be very, very thorough in your analysis of that, and then you can either use it or not, apply it as you want to. You've got to be quite precious about that and make sure it is very much included in the mix. (RS_10)

Where research has been completed by an external agency for a client, design organisations need to be mindful about the efficacy of undertaking additional research. As noted, there may need to be an immersion activity that enables familiarisation with its findings, but duplication of effort should be avoided. One respondent elaborates:

Some of it is actually how clear the client is as well cos you might find that some clients have already done a massive amount of what we would probably offer them as a business, so actually the need for me and my team becomes a lot less. (KS_19)

Clients may wish to manage research activities as they like to manage the questions and retain intellectual ownership of the resultant knowledge. This doesn't not mean that design organisations are not provided access to this information, but it means that the tacit knowledge built up during the progress of the research activity may not be passed on to the design team. Client based knowledge can be highly valuable to future oriented design projects as it provides access to historical data that contemporary research activities would not be able to provide.

The substantive factors associated with this theoretical category are denoted below:

Theoretical category	Substantive factors
Client based knowledge (4.5.1)	Tombs of previous research; review and synthesise existing research; one persons viewpoint – bias and filters; different conclusions; client leverage in research

Fig. 4.5.1 Substantive factors associated with the theoretical category 'Client based knowledge'

4.5.2 Theoretical category: External agency driven knowledge

External agencies provide design organisations specialist input and knowledge that informs design activity in a number of ways from undertaking all of the research associated with a project, to providing a very focussed and limited input upon a specific issue. Respondents acknowledge that they are not able to provide all services required by clients and as such, many have developed extended networks that they call upon where their knowledge and expertise is not sufficient. One interviewee stated 'We can get some stuff where we know an agency is really specialist and we can literally get a brain-dump from them and decipher what is applicable' (AR_10). The manner in which engagement are managed and coordinated vary greatly but the majority of instances see design organisations at the centre of activities akin to the circus master directing the proceedings in a circus show. There may be instances where design organisations are drawn upon to service a particular need within another network or development project but these instances were not prevalent within the interviews. Often design organisation sub-contract a particular specialist element of a project to a third party and coordinate these activities. Respondents confirm this below:

We like to go as deep as people will let us, but we also know what we're good at, we know what we're not good at, and we like to partner with people that are really, really specialised and good at what they do. I like to think of us as a kind of creative circus or a creative movie studio, and once we've figured out exactly what the vision is of what we're trying to do, we'll go and find the right specialist to help make it happen, because we're not specialist at everything. (IM_02)

If we're going to hold a focus group on X, it isn't our core business and to recruit for that and to do that to the standard it would need to be for a certain client, we would rather partner with people that we know are in customer focus groups, and we'd rather draw on that and work collaboratively with them than try and pretend that we can do that element of things when we'd get a better result from using an expert so that is something that we do. (KS_08)

We'll quite often work on a project and outsource to experts' particular areas where our knowledge is weak. So if there's an area that's really in-depth, or we need something that's going to be out of our boundaries, then we collaborate and we'll work with different either individuals or agencies. (AR_09)

Respondents promoted the collaborative nature of these relationships and recognise the benefits this approach provides. Rather than undertaking an element of a project badly, they will seek to partner with specialists. A negative aspect of this approach in the loss of

nuanced understanding of the data as involving a third party does put another link into the knowledge chain. Design organisations address this potential weakness by collocating members of the external agency within their development space. For example:

What we try and do more though if possible is get research undertaken within the studio because that's our knowledge. If you're getting secondary data you've not got such an understanding so where possible, we'll always get primary data. (AR_10)

This acknowledgement of the potential loss of tacit knowledge highlights the complex relationship between clients, consultants, and third party sub-contractors and continues to present challenges to the management of multi-disciplinary, multi-organisational development projects.

External agencies may provide a form of validation to research that has been conducted within a design organisation providing a border world view that confirms the efficacy of findings and conclusions. Additionally external agencies can provide additional evidence that goes a long way to substantiating a point of view. This view is supported by the following respondent:

There are research companies out there that we look at, or we buy reports from, that qualify some of the thinking that's going on here and sometimes quite reassuring to know that other people are kind of seeing some of the same things as you or they help us fill in the gaps. (SB_05)

I discovered Futurelab four years ago and I went to hear them talk and I just had a moment of like, you almost can feel yourself hyperventilating because you think, Oh my god, where do I start, I didn't know anything that this man's just said and it's all relevant. ... I think somebody like the Future Laboratory almost want them to throw in a few things you've not been aware of because, otherwise you wouldn't go. (KS_09)

We subscribe to a lot of expert databases and we go to expert talks so we'll always go to the Future Laboratory for example. (AR_09)

Design organisations may engage external agencies to undertake design work rather than research. This is particularly evident within organisations that have an in-house design capability as this approach can invigorate thinking much in the way that design organisations do when undertaking work for clients. This external perspective, and importantly lack of tunnel vision developed across numerous projects and an extended time period, can open up thinking to probable, possible and ultimately preferable futures. This is evidenced below:

We use consultants to generate more ideas. I suppose it is design work, but its real front-end stuff. Their ideas stabbed in the dark and the cleverness comes in picking which ones are right. The last time we did a strategy project, we had a consultancy in the UK, we had a consultancy in Japan, we had two consultancies in America, and they generated ideas about what the look should be like for office equipment in two years' time and five years' time. (WN_11)

This global perspective is mirrored in the way in which design organisations engage with research agencies by utilising a wide range of inputs irrespective of their location. ‘The other thing is to have these people all around the world that feed you insights and information and that’s part of looking at the context and looking at the big picture’ (LH_08).

Engagement with external research agencies doesn’t always prove to be a productive relationship and may not provide anticipated results. The fit between organisations, anticipated outcomes, and expectations of deliverables can all contribute to unsuccessful engagements. One interviewee recounted the unsuccessful use of an external futurist and trend agency but was not able to identify the cause of the problem.

I did work and collaborate with some futurists and some trained people. Maybe it was the wrong people that we brought in but that wasn’t inspiring at all to me, I don’t know why, it’s like their idea of what the future is didn’t do anything for me, I don’t know why. (PR_05)

Because I was interested in those channels, we picked one group and in that case it was a failure. The momentum got lost. I still hear a lot of people that I value as designers, see a lot of inspiration in those channels so I didn’t stop completely believing in it, just for me, I haven’t figured it out yet. (PR_14)

Interviewees noted that the use of external agencies may be problematic when this relationship involves one way information exchange, i.e. being told what the future will be. Designers tend to react against being told what, or what not, to do as this restricts their creative activities as discussed below:

I know there’s a lot of trends work that’s done that people almost become dictatorial. Yellow is going to be the next thing and it’s kind of like, Well you said it so that means it is, you know. It becomes a self fulfilling prophecy. (MK_06)

Use of external agencies within future oriented projects is increasingly being adopted to ensure that comprehensive services can be offered. The development of relationships between external agencies and design organisations relies on a mutual respect of the competencies of each partner.

The substantive factors associated with this theoretical category are denoted below:

Theoretical category	Substantive factors
External agency driven knowledge (4.5.2)	Partner with specialists; reassurance that others are aware; global networks and inputs; collaborations not always productive; self-fulfilling prophecy

Fig. 4.5.2 Substantive factors associated with the theoretical category ‘External agency driven knowledge’

4.5.3 Theoretical category: *Knowledge flow within projects*

The manner in which knowledge flows within design projects, and how this is managed, monitored, and facilitated, drew attention from interviewees. Knowledge may flow between the design team and clients, between the design team and external agencies and specialists, between members of the design team, and from clients to a wider stakeholder group (that may include customers for example). Although all of this is not future based knowledge for designing, the appropriate flow of knowledge was seen to be critical for the success of design and research projects. Where gaps in knowledge were evident within the design team, this was sought from external sources, be it a publication, person or organisation, and was not deemed to be a critical barrier to the development of projects. For example as respondent SB elaborates:

I think that's the biggest indicator of anything we don't think we have in terms of knowledge or expertise or perspective that we think are pretty important, we just go and get, whether that's a publication or a person or an approach, we can bring any sort of thinking to bear on the problem in a way that we can co-ordinate with all the other strands of an enquiry. (SB_05)

Client consultation and collaboration was also an important driver in knowledge flow as ultimately their viewpoint upon the direction of a project was centrally influential. In some instances a stage-gate approach was evident where at specified review points within projects, clients were consulted with to assess the appropriateness of the direction of the project. Mechanisms employed noted by interviewees included formal presentations (face to face, video conferencing, etc), participatory workshops, role playing, in context testing, hall tests, virtual fly-throughs and VR engagement, and various forms of prototyping. There was a focus upon ideally uncovering a jointly shared vision that respected the multitude of views held by stakeholders.

Expert opinion and specialist input was also noted as an effective knowledge flow mechanism by providing detailed and nuanced input at particular stages within projects. This occurs at both the front end of projects where knowledge is being developed, to the latter stages of projects where expert opinion provides validation of potential outcomes. Respondents echo this below:

This is quite often done through review with the client to see what's really resonating with them, and it maybe that we're responding to a knowledge-sharing workshop that we've had with them, where stuff's put on the table and what again we don't want to do is replicate what they already know, right? We need to find out what we know between us. (SB_08)

When its design research, we nearly always have some sort of expert opinion, more so than in a lot of other projects actually. I think that's because it's such a subjective area, it's really nice to get a place from which to start and so experts are very useful. (RH_07)

Knowledge can be drawn in by the design team in a number of ways. Secondary research sources often include magazines, newspapers, books, and online portals as well as

engagement with special interest groups (SIGs) and trend spotter networks. Knowledge can be drawn from these, and many more, sources to provide future based knowledge for designing. Respondents detail this below:

It's a small thing but I think it's really important is magazines and newspapers. It's incredible what you can get and what you can pass on and, one of the things we do is we subscribe to basically everything. From stuff that's very mass to stuff that's very niche, cos often with the stuff that's mass, you're not really maybe going to learn anything new, but it can often act as sources of validation. Whereas often some of the niche magazines, you can often tap into stuff before it's relevant. (AR_10)

Books are part of the media we look at. A lot of the people that are doing consumer trends, are really accessing the so called trend spotters around the world so it's still quite sort of consumer driven. I also have had access to things like Shaping Tomorrow which isn't entirely consumer-driven, it's also business-driven and economic-driven, the World Future Society, again which has a bigger picture on what's going on, and I sometimes look at the New Scientist. I mean it's all information it's just what information you look at. (LH_08)

Where design organisations are involved with large clients, they become involved as contributors to broader organisational activities. In this case they act as external experts for the client rather than on behalf of the client. One respondent noted:

When you work with like a company like Unilever for example, this project was an example where we got heavily involved with them on the research side of things. (SHL_02)

Design organisations may be involved in all aspects of a project from initial strategy to final delivery and with larger clients, may bring their expertise to bear outside of their traditional domain. For example a design organisation may become involved in the knowledge floe required to take a particular item to market and involve liaison, for the client, with their manufacturer. 'We got involved in researching the vendors that they were going to use to actually utilise and make this thing' (SHL_02). This involvement, from conception to launch, demonstrated the versatility that design organisations are increasingly being asked to demonstrate. This is more prevalent when larger clients are involved.

Some design organisations do not feel the need to engage with external agencies to develop knowledge in future oriented areas as they have this capability within their offer. In particular design areas, parts of graphic and fashion design for example, see this capability as one of their key differentiators within the marketplace. 'Clients come to us because they know we have that kind of cultural and trend awareness, that's why they choose us. We would never use third party forecasters in that kind of way' (PB_07).

The designer as visionary is often a stereotypical image of design in the mass media, fuelled by the notion of fag packet designers and fashionista prima donnas. This popularised image of designers who spend most of their thinking and looking out of the

window is far removed from the realities of contemporary design in the 21st century where a pragmatic approach is more prevalent.

The development of shared language and understanding is crucial to effective knowledge flow and was voiced by interviewees. An effective dialogue between stakeholders can assist knowledge flow by engendering a shared ownership of projects. The use of visual props to assist in the development of a shared understanding was seen as an effective strategy. Respondents note this below:

Some clients would come to us with a whole set of kind of visuals and kind of say, this is the kind of vibe, the direction that we're kind of interested in and so they will have done a little bit of research themselves and sometimes come in with tear sheets and magazines with stuff they like. It's kind of sharing a common language really. (PB_07)

I find it easier to do when you have something visual or something physical in front of you, to say to them, But you said this, but what about if we did this? whereas if you just said initially, Oh what if do that? They'd be like No, no, no, we want to do it that way. If you actually show them like a concept and the reason why that potentially makes sense. (SHL_08)

Interviewees stated that experience within a particular area or sector enabled them to develop a level of confidence with the issues at hand and nature of terminology used. This confidence, referred to by some as experience, helps in the development of respect for the capabilities of stakeholders. Additionally, this confidence provides stakeholders with some level of assurance that the team is capable of delivering the project in an appropriate manner. As one interviewee explained 'By talking to people, you get used to the language, you get used to the world of trends, you get used to immersing yourself in all of this different thinking' (LH_05). Another respondent elaborates:

You can just see that your mind sharpens over the years and you become clearer on what they used in seeing some of these mood boards they create. What are the things that we're giving them that then ends up on a mood board that's shown as part of a vision for a project and what does strike a chord with them? (KS_08)

Knowledge flow can be assisted by individuals with a high level of understanding not only of the subject area being explored, but the way in which this knowledge is used and consumed within future oriented projects. The substantive factors associated with this theoretical category are denoted below:

Theoretical category	Substantive factors
Information flow within projects (4.5.3)	Knowledge-sharing workshop; spread of expert opinion; inputs: books, magazines, newspapers, field trips, SIGs; development of shared common language; information bias; aware of specialist language

Fig. 4.5.3 Substantive factors associated with the theoretical category 'Information flow within projects'

4.5.4 Theoretical category: *Expertise within design - team based approach*

Design teams deliver both creativity and pragmatism; identification of possible ways in which the future could develop; and undertake a series of actions to enable an organisation to create the best possible future for itself. Team based interactions are essential to support these activities.

Team based approaches in design offer up possibilities for collaborative and co-created trajectories that both draw upon, and develop, team based capabilities. Ideas in a design firm can emerge from a collaborative creative process, rather than from an individuals' contribution. Team based approaches allows stakeholders to draw upon the collective knowledge and expertise of the members. Respondents confirm this below:

At the end of the day it comes down to the team you've got. You can't sell something that you can't deliver, with the majority of it being done in-house, you just can't. We've always built this service and the processes and its capability on what we've got in the building, using as little kind of external input as possible. It simply makes it more efficient and it helps to develop knowledge-sharing practice and a much better collective consciousness. (SB_25)

I suppose we've got this unique way of looking at and doing things. The way that the community is set up, it's such a richness of different expertise and different backgrounds, it's such a big mix of people from all over the world and different disciplines in design and research where it's just a vibe of the community that seem to have a really cool way of dealing with the client and almost helping them scope the project out. (MK_10)

Some design organisations view themselves as a pseudo think-tank that is able to provide complete services to clients that are a one-stop-shop for their creative needs. The development of information technology means that knowledge sharing has been made easier (or at least quicker) such that distributed teams can work upon the same project without the need for collocation and face-to-face meetings. Forward thinking process have developed utilising the expertise resident within designerly approaches augmented with a heightened understanding of management science, business process, and of course future studies. One respondent observes:

I think that a lot of the more interesting or the more sophisticated forward-thinking processes generally spin out from the consultancy field. I think part of the reason for that is it is such a competitive place to be that you've got to innovate within yourself to stay ahead of your competition. This is why, I think, people have added on new services or integrated new skill sets in really interesting ways, both to compete in the market but also to add value to the overall process. (SB_11)

As design consultancies normally act externally to the client organisations they are commissioned by, they are able to provide perspectives that are free from the constraints in-house teams face. They can provide an external viewpoint, and although this may be in opposition to internal client thinking, may be valuable as it opens up avenues of thinking that hitherto may not be considered. This was confirmed by respondents:

I think you have to remember that as a consultancy business you are a fresh pair of eyes, if anyone steps outside of their office and they've got an in-house team, one of the weaknesses of an in-house team is that you can potentially become blinkered, or out of touch with the things that are going to give you original thinking. In the consulting environment, you work across so many different markets that you're constantly challenged or stimulated or being made aware of developments that might be transferable. So I think that there is a different kind of culture here, and we as a business are trying to make sure that whatever situation or context we're talking to our clients, we can give them an informed view of what futures means to them and why they should be looking at it. (SB_16)

Sometimes when you're not in the thick of a situation, like a lot of corporate or staff designers are, sometimes we have a benefit of a distance and an opinion where we could, we know what our company's strengths are and also what our weaknesses are, and sometimes they just shouldn't be doing some things because there's no way they'll pull it off. I think we're sufficiently detached from a lot of our clients that we have a strong relationship too, but we're just able to give them better advice than they can give themselves sometimes, and that's a really big thing to see and a hard thing to prove, but it is often the case. (IM_04)

To be able to provide valued services to clients, design organisations must be well organised in the way that they can access knowledge contained within their team and ensure that their competencies are articulated in an effective manner. There may be a tendency to focus upon the competencies contained within design teams to the detriment of engaging with external agencies. This may take the form of tailoring projects to suit the team's capabilities rather than the needs of a given project. One way in which this is augmented is to embed an external individual or agency within the design team. This provides the best of both worlds as it enables design teams to provide a comprehensive service while ensuring that the tacit knowledge developed throughout the project can be transferred to the permanent design team. One respondent observes:

On the research side I tend to guard that pretty carefully, so as much as possible, we do it internally, and I've built up a research team to do that. There are a couple of individuals consultants we've used who've done a lot of retail research for us so they helps us do research in that area. So typically it's people who are bringing us new areas that we might not know too much about or they're extensions of our team. (GM_12)

If we use consultants, we will use consultants for doing human factors testing or something. I try to keep that kind of research in-house because I consider that the most valuable research. (GM_06)

Interviewees declared that their preference was to undertake as much of the research required, if not all, within the broad context of their organisation. Although noting that this restricts the possibilities available, the ownership of research knowledge 'positions our group strategically within the company', enabling them to become recognised as 'strategic knowledge experts and trusted advisors around customer issues' (GM_06).

Some respondents discussed the negative aspects of utilising external agencies to undertake research citing limited transfer of expertise into the design team, as well as

loss of tacit knowledge that could be applied to other projects (as only knowledge deemed relevant for the particular project is usually communicated) as concerns when using external agencies to undertake research. One interviewee noted that 'there's no substitute for going and doing things yourself and understanding what the project, what it's all about' (TT_08). Respondent TT elaborates:

We have used other people to do research for us in the past but the problem is as a team, what we try to do is an end to end solution, so the problem is if I get a research document land on my desk and I can read through it, all I'm doing is effectively reading the outcome of somebody else's work. Its second hand information, they might have seen something that I don't see as relevant or have missed something that I can see, think was great. (TT_08)

Concern was raised that utilising external agencies for research activities, and then utilising this as a trigger for design undertakings means that there is a potential disconnect between research and design. Research activities may result in over analysis of particular issues without a broader viewpoint, or as one interviewee stated 'they get so in-depth they miss the big picture' (TT_08). Developing research and design competencies within design organisations was deemed preferable to combat the potential disconnect between the various research, design and development activities Conducted. There is a developing culture of design organisation employing non-designers within their design teams to assist in the development of understanding of cognate disciplines who increasingly contribute to design projects.

Not all projects give sole ownership of the creative process to design organisations. Design organisations may be engaged to undertake research for a project where they won't be translating this research into physical proposals, i.e. they will product research that will be utilised by another design organisation. In this context, design organisations are providing research as an external agency and contribute their expertise in the collection and analysis of research rather than the translation of research into design intent. This is a reversal of roles to contemporary design practice.

We might even be one of a number of agencies working on a project where we're not the people that are going to be translating that research into designs, we will just be producing the research. Despite the fact that we offer a full list of services end to end, people do cherry-pick and really, it's up to us to put together a proposal which sets out the value of integrating those services (SB_22)

Design organisation utilise team based approaches to draw out pertinent issues from research to use as guiding principles for design activity. This may involve establishing a research strategy that they may, or may not, be responsible for executing. This process normally yields evidence that can be used to validate or underpin design decisions, which in turn provides reassurance to clients or senior managers with regard to the efficacy of overall strategic thinking. Respondents elaborate:

A lot of design groups will say, you know we design for the customer, right, but unless you can back that up with the knowledge and being the expert on the customer and the processes, it's kind of a false sort of statement. (GM_06)

The consumer point of view is clearly very important and that's what we're about so we have to speak to a good number of consumers. We try and find the methodology or the most effective channel to speak to them which we think is most appropriate to this particular brief. That might be online, it might be groups, it might be depths (in-depth-interviews), it might be sort of product deprivation tasks, or even product placement tasks. (RH_07)

A broad interpretation of who constitutes target consumers is evident within future oriented projects as this provides evidence that supports tangential or non-linear conclusions. If only current consumers are considered, there is a tendency for incremental developments to be considered. Design teams utilise multiple channels to engage with potential consumers and as time horizons increase, the scope of research is extended to include outliers and unexpected elements.

We tap into areas non-related to the type of business we're in because that will give us future opportunities. ... You can see just by what's happened in the market now, that we have to consider things that are pushing the boundaries to look at future opportunities. (AR_09)

The substantive factors associated with this theoretical category are denoted below:

Theoretical category	Substantive factors
Expertise within design - team based approach (4.5.4)	(design) team based capabilities; consultancy approaches; external point of view; develop internal competencies; team member not leader; drawing out issues; extremes and boundaries

Fig. 4.5.4 Substantive factors associated with the theoretical category 'Expertise within design - team based approach'

4.5.5 Theoretical category: *Visually driven communication strategies*

Communication of future based knowledge for designing and corresponding design propositions is undertaken in a variety of ways, and involves a broad cast of actors. The communication of such information is akin to the envisioning of coherent cross sections of the future that are comprised of various interconnected elements. All statements concerned with the future are necessarily associated with a degree of uncertainty and as such, communication of future oriented information is regularly met with scepticism. The need to provide credible evidence in support of claims is an important criteria by which communication is judged. Visual mechanisms are often employed as this not only enlivens dense data, it provides sketches of the future' rather than hard and fast facts. This approach of creating snapshots rather than feature films of the future intends to inspire stakeholders rather than being overly prescriptive. One respondent observes:

This is such a tricky thing and I'm sure everyone will tell you this, it's about leading towards an inspiring point of view rather than leading to something reductive and prescriptive, and that's ever the tightrope that anyone involved in design research is trying to walk. It's about picking out the stuff which we feel opens up rather than closes down. (RH_06)

Visual communication methods are employed to assist in the opening up process or simply creating pictures of the future. These pictures of the future are employed to 'bring the data to life' and inspire future action. One interviewee maintained that 'we don't want death by PowerPoint, we want a nice pithy presentation which leads them (designers) to a point where they can springboard into whatever they need to do' (RH_06). The form given to the pictures of the future essentially depends upon the aim of the inquiry, on the available design possibilities and on targeted avenues of communication. Designers contribute to this process as they visualisation and communication skills underpin much of the translation of future oriented information into actionable knowledge.

I think lots of our processes are shaped by designers because they're our audience and we sit next to them and they help us with some bits of the visual research so there's no discontinuity. We're good at providing things that designers can use because we do it all the time, and if we were in doubt, we just say, we just have to ask or observe how people read or digest things. That's something very much built in to the culture. (SB_07)

I think designers will always be much more visual in the way that they research something or the way that they're trying to understand what they're doing. Designers will approach it not from what the customer's telling you but from what the customer's doing. (KS_11)

Communication of such visions of the future can be supported by any number of simple or elaborate graphical components. Design organisations are inherently visual in their approaches to presenting future oriented information although this is not an approach employed in cognate disciplines. Market research agencies often utilise more traditional communication approaches such as reports and data laden PowerPoint presentations.

When we present a lot of our presentations are Flash-based, just so we can make them really sensory, so we can get sounds, we can get movement because you might want like a bit of movie, some photos on the street, to some music. They all kind of build up the story. That's something we do and I've worked with quite a lot of the research agencies around Europe and you still tend to get very bog-standard reports which include really useful data. (AR_12)

Designers have recognised expertise when dealing with complex visual data yet do not necessarily possess as advanced abilities in dealing with the written word. Although a generalisation, designers tend to gravitate to visual communication. Where there is a need to engage with complex written data, design organisations employ these skills by using non-designers, or highly literate designers, to process such information. This process is often overseen by experienced design project managers. Respondent SB elaborates:

Designers don't tend to like reading which is why we've invested in specialists that do do the reading and do put together reports that can be read by designers as well as by people on the client's side. It is really about creating a collective consciousness. (SB_15)

These aren't the sorts of trend reports that you see designers put together, there's a really, really sophisticated understanding, a framework that will come from these going forward and this is where, I think this gets people really excited, but as we move forward, this is where they see just how much work has been done. (SB_28)

Design organisations bring their strength to bear upon the communication of complex information to a broad audience. The ability to provide summary level communication, underpinned by the depth and breadth of research, is a core competency of designerly approaches. By boiling down complex data into a coherent and visually engaging story, design organisations and designers in particular, demonstrate a differentiating competency that many other sectors and specialists do not possess.

The one thing I think we're really strong at, and working with other research agencies they're quite weak at, is the actual presentation. I think sometimes you get so wankery about the details, often your audience doesn't even understand the details, so we try and get it so that everything we're talking about is visually demonstrating that as well. We're aware that because our work's so visual that people can interpret many different things that. (AR_12)

Effective communication of future based knowledge for designing enables project teams to firm up their understanding of the ideas being proposed and how they fit in a larger context. Communication, particularly involving compelling stories, are essential to building credibility, give permission to explore, and make order out of chaos. Design organisations have strength in utilising visual approaches to enhance and underpin communication. When external agencies provide future based knowledge for designing, the need to translate this information into a form that designers can readily work with, as well as translate this information into a form that clients can understand and respond to, benefits greatly from a visually engaged approach. The use of designerly acumen to visualise to communicate is embedded in many future oriented design project teams

The substantive factors associated with this theoretical category are denoted below:

Theoretical category	Substantive factors
Visually driven communication strategies (4.5.5)	Lead to a point of inspiration; sensory and pithy presentations; designers research and communicate visually; designers don't like to read; imagine creatively

Fig. 4.5.5 Substantive factors associated with the theoretical category 'Visually driven communication strategies'

4.5.6 Summary

This section has discussed empirical evidence which supports the proposition 'External agencies provide future based knowledge for designing'. Key factors within the discussion

of this proposition include the engagement with existing client based research and the value and efficacy of this research to future oriented activities; the role of external agencies in the knowledge supply chain and the barriers and drivers to such engagements; the challenges to supporting effective and efficient information flow within projects – to all stakeholders; use of design expertise within the design team and associated team based approaches; and visually driven communication strategies to convey potential future states.

This section has presented research findings that confirm that external agencies provide future based knowledge for designing. Theoretical categories and substantive factors related to this proposition are denoted in figure 4.5.1:

Theoretical categories	Substantive factors
Client based knowledge (4.5.1)	Tombs of previous research; review and synthesise existing research; one persons viewpoint – bias and filters; different conclusions; client leverage in research
External agency driven knowledge (4.5.2)	Partner with specialists; reassurance that others are aware; global networks and inputs; collaborations not always productive; self-fulfilling prophecy
Information flow within projects (4.5.3)	Knowledge-sharing workshop; spread of expert opinion; inputs: books, magazines, newspapers, field trips, SIGs; development of shared common language; information bias; aware of specialist language
Expertise within design - team based approach (4.5.4)	(design) team based capabilities; consultancy approaches; external point of view; develop internal competencies; team member not leader; drawing out issues; extremes and boundaries
Visually driven communication strategies (4.5.5)	Lead to a point of inspiration; sensory and pithy presentations; designers research and communicate visually; designers don't like to read; imagine creatively

Fig. 4.5.6 Summary of empirically derived substantive factors and theoretical categories representing the proposition 'External agencies provide future based knowledge for designing'

4.6 Research Proposition 06: Futures thinking approaches are increasingly being employed in design

This section presents research findings against the above research proposition (RP06). In the face of ever increasing complexity, both in markets (consumer driven) and development cycles (technologically driven), design is being asked to achieve more, with less resource, more quickly. To combat and address these challenges, design organisations are increasingly engaging with strategic rather than operational factors in which they are being called upon to perform transformational interventions. These

interventions are asking questions to organisations that they are not necessarily ready or equipped to answer.

The call for designers to engage with the future in a pragmatic yet strategic way is predicated by the need to base transformational interventions upon an understanding of the drivers that shape the landscape in which they operate, what Brown (2009) defines as what is viable (business context), what is feasible (technological context), and what is desirable (user context). Evidence supports the proposition that futures thinking approaches are increasingly being employed in design as a means of meeting the challenges of continual change in what we want to have, the way we want to use it, and how this can best be delivered in a meaningful and valuable way.

As one interviewee captured this drive succinctly, 'the future is decided by those who bother to turn up. It's a very proactive. You don't just sit there waiting for the future to happen and planning to react to it; you've decided you're going to shape the future' (SR_01).

The theoretical categories related to this proposition are denoted in figure 4.6:

Theoretical categories
4.6.1 Increasing use of futures thinking approaches in design
4.6.2 Many inputs, multiple variables, continual change
4.6.3 Evidence based direction, research underpins actions
4.6.4 Concretisation: making tangible, actionable, and implementable

Fig. 4.6 Summary of empirically derived substantive factors and theoretical categories representing the proposition 'Futures thinking approaches are increasingly being employed in design'

4.6.1 Theoretical category: *Increasing use of futures thinking approaches in design*

In recent years, and particularly over the last decade, there has been a shift in the nature of projects that designers are being engaged upon. The move from the tangible object to the intangible experience is mirrored by the increasing move to designing with rather than for people. One interview noted the early stages of this change in design stating:

I think I probably saw something that was about to happen to the design industry cos I do think that it's changed. We didn't get briefs eight years ago that said Don't draw anything for this pitch, just tell us the challenges we face as a business, it just didn't happen. You'd get a brief and you take a materials pallet and a mood board and a few sketches and you'd either win or you didn't' (KS_15).

Organisations are increasingly calling upon designers - not marketers or strategists - to tell them what challenges they will be facing as a business in the future, and in light of these challenges, what design can do for them to embrace the challenges.

The turning point was Principles in 1999 where they sent us a brief to pitch and it just said, literally tell us the challenges we face as a business over the next five or ten years, the threats, the opportunities, and what you would do about it. This is a non-creative pitch. How do we respond to that? I was wheeled in as the person that did words not pictures, and we won it based upon being able to say, Mintel says this, and I was really naïve at the time but it was like my attempt at telling them how to do that non-creatively. Now almost ninety percent of the things we're given are non-creative. (KS_15)

The implication of this shift in demands from client organisations is that design is in effect moving up the food chain and engaging on much more of a strategic level. There is an increasing symbiotic relationship of design and strategy. One respondent notes:

The wind is beginning to blow our [designs] way. The owners of brands and the people that control them are increasingly turning towards design, and I mean design as opposed to communications, as being the key strategic partners for the brand. That implies a shift up the food chain, it implies a more business focus, more marketing focus approach and types of projects. (SR_19)

Design-led manufacturing organisations are also engaging with design as a means to both explore and demonstrate potential future areas for further investigation and committing a corresponding level of resource to undertake such research. Respondent AR elaborates upon this below:

There's definitely more thinking about the future in design, especially in consumer electronics. Research is becoming so much more important. In terms of research, we were very much supporting product design, probably the first few years I worked here. Then about five years ago, the research was leading. A few years ago, especially in larger companies, research was just research, whereas now people are starting to understand the different disciplines in research and the importance. (AR_14)

Here we can see that there is a shift in which research is moving to the foreground of activities to support design undertakings in a manner that enables organisations to engage with future oriented projects. This engagement is fuelling the increasing recognition of design-led futures research, in the form of trends research or identification of unmet needs for example, and the connected creative exploration of that future proposition. Respondents support this viewpoint:

There are a lot of intangibles to do with trends. I originally started out doing research, observational research in ethnographic methodologies and some time ago trends was a bit, Oh, that's mauve, you know what I mean? That really just absolute top ethereal what's happening next season, or they was some kind of forecasting, Henley forecasting. The field has become much more densely arrayed with different types of offer now and it's become much more credible and people perceive the need for it, I think a bit more. (SB_02)

Now we find we're engaged much more about front end where we actually are helping identify, obviously, those unmet or latent needs, trying to identify where is the opportunity, what are the white spaces out there that our clients can target or benefit from. And really then roadmapping out our approach for these are the products and

services that would take advantage of that opportunity, or those opportunities, and this is what they'd look like, and try to put it into a tangible form where a client can experience this future and then start to rally the organisation and get people behind it and work their way towards it. (LW_03)

The creation of a potential future solution to a given situation, and in turn using this to rally the organisation and get people behind it was supported by another interviewee who stated that 'you're beginning to get an idea of why visualising the future is, in a sense, of creating that momentum behind which the future becomes inevitable, is a lot to do with presenting desirable image of the future' (SR_15). The creation of desirable (or preferred) rather than probable future is a reoccurring theme in foresight which as noted in the literature review, closely aligns with many design approaches.

As noted earlier in this section, design is increasingly moving up the food chain and undertaking strategic as well as operational activities. This is a trend that interviewees maintained would continue and potentially increase as design organisations were able to demonstrate activities in future-led projects.

I think in five to seven years' time Seymour Powell will sit higher up the food chain and I think we'll be making more money, and I think we'll be better at predicting the future as we'd have done an awful lot more of it. I think we'll be better at shaping the future, because we'll be involved much more deeply with an organisations, not just in terms of research and strategy formulation but also implementation, so we'll be making these things happen. (SR_19)

The drivers for the noted changes in design (from objects to experiences; and operational to strategic) are many, interrelated, and complex. These changes are organisation and sector specific, and no one contributory factor was highlighted within the interviews. Respondents noted organisation culture, globalisation, and specialisation (of services) are contributory factors underpinning such change. Respondents echo this:

Well, I think it would be partly cultural changes within companies, but globalisation has driven a great acceleration of how people have to develop product, the time cycles, and this idea of things taking longer to develop than the advantage can be gained in the market. You've got the ever-shrinking timescales of what you can actually develop to make any profit out of is a big pressure which drives people much more towards the future and having to be able to account for that in whatever way possible. (SB_03)

I think specialisation has just meant that the thinking stuff through, coming to conclusions, doing the research, doing the analysis, coming up with a direction, an idea, conclusions, was always part and parcel of the design process but it's just been that people have decided to specialise in that front end at the expense of designing. (SR_03)

Respondents confirmed that they were aware of the strength of the key domain they operate from, i.e. design. Although there was discussion of the concept of the T-shaped person, the core discipline was always credited to be design. In this, design organisations were mindful not to try and replace the services of management consulting with design.

They noted that the engagement with non-design specialisms such as marketing and branding was increasingly becoming ventral to their day-to-day activities but they see that through a designer's eye and does not spell the end of the design specialism. Collaboration and interdisciplinarity were seen as essential but designerly approaches should always play a key role when undertaking future oriented projects. Respondents provide examples below:

Fundamentally we're a design consultancy that offers an understanding of the future and that's why I've become more visual in what I create. We're looking at in the future if we start to show the market sector stuff that we're doing, we're going to design something that just looks beautiful to convey that because ultimately we're not a research company and we shouldn't look like that, we should look like the reverse of that. (KS_17)

I think that one of our key strengths is that we're perhaps a little bit more marketing savvy and brand aware and able to understand brand-speak and the nuances of that. I can only see that side of it becoming more important to us. (SHL_10)

The balance between the different activities within individual future oriented projects varies within organisations. Research and strategy, the term given by one interviewee to describe strategic activities often involving a strong research component, varies from 20% to 80% within any given project. Conversely, this implies that the design component of projects varies to the same degree. One respondent observes:

It really changes, I mean, some things like the RBS work or the Honda work, it would be like eighty twenty strategy and research versus design. So eighty percent strategy whereas, someone like Virgin, twenty eighty, the reverse. It's really, it's really hard to quantify' (KS_17).

Irrespective of the split of strategic research work vs. design work contained within projects, there was frustration aired with regard to the small amount of future oriented research or design concepts that are actually taken further than the original presentation or report delivered to clients. There was agreement that most clients were risk averse and not always willing to commit to a board range of future activities, preferring to select a small number of concepts to address.

They'll probably take two of those hundred pages of Wouldn't it be good if you did this? into reality. For all sorts of reasons that you'd get really upset about if you kind of thought about it for too long. But there's a helluva lot of things that clients should or could or would do that in that kind of vein of future thinking just doesn't come to fruition. It's kind of part of the job really. (KS_19)

The substantive factors associated with this theoretical category are denoted below:

Theoretical category	Substantive factors
Increasing use of futures thinking approaches in design (4.6.1)	Non-creative pitch and change in design; research leading rather than supporting; increasingly complex development landscape; design-led focus; move up food change – strategic engagement through design; split between design and strategy

Fig. 4.6.1 Substantive factors associated with the theoretical category 'Increasing use of futures thinking approaches in design'

4.6.2 Theoretical category: *Many inputs, multiple variables, continual change*

Future oriented projects have to address seemingly ever increasing sets of issues, and the range of inputs into such projects continues to grow. When focussing upon a certain issue, be it from primary or secondary research activities, design organisations can explore a range of potential directions with the same set of research data. By focussing or exaggerating a particular parameter, the potential trajectory can change radically. The challenge here is to provide clients with a range of possibilities that may impact upon their business or sector, and the means to address these possibilities. The increasing level of inputs into projects must be dealt with in a pragmatic and responsible yet creative manner. This is discussed by respondent RI:

There's a whole bunch of things that they have to look at, a huge, huge list of variables and factors to consider. You just start playing with those things, and exaggerating one or two, and they lead you in completely different directions in terms of strategic response to a set of conditions. That's really what you're trying to do there is provide possibilities for eventualities. As a business, how do you respond to this potential eventuality? Because the future could look like this, or it could look like this, or it could look like this. Depending on which of these things kind of happens. And that's the approach you take, you just take what's going on now and say, well, you could spin off in this direction, this direction. If it does this then it means there's three things that come off of that, as a way of addressing them. (RI_08)

The inputs to the design and development process, often drawn from extensive research provide multiple perspectives and potential interpretations. Micro and macro issues need to be evaluated within the broader commercial and cultural contexts that the organisation operates in. This internal and external perspective need to inform project strategy and decision making. For example, one respondent noted:

When we face a design problem from a company, we are looking in and we are looking out. What I mean by looking out is we look at the market. Looking in, we look at the company, because these two need to match. (PR_07)

The combination of internal and external perspectives, aligned with past and present perspectives, all underpinned by a broad contextual awareness can be likened to environmental scanning - its scope like a 360° radar sweep. One interviewee identified clear value in engaging with inputs from the past as a means to be proactive in consideration of the future, specifically:

When you're studying the past you can really see evidently what the kind of catalyst was for a new trend or for a resurgence, and then you could see how everyone followed as a reaction, whereas now people are more studying the past so they can initiate rather than be so reactive. (AR_04)

The increasing interest and adoption of futures thinking approaches in design is in part a response to the opportunities and challenges presented by the ubiquity of computing within our everyday culture. This is echoed by respondents:

I think there's a wide, broad effective buy-in to the [forecasting] discipline. I think the idea of the culture of the acceleration of the digital world, where things accelerate massively and can be instant and develop very quickly, cause people to wonder much more about the future in business. I think it's becoming a still more powerful field for people to understand where they're going and how they're going to meet their challenges. (SB_03)

The call from business for a better grasp upon their future (as an organisation and individuals within that organisation) reflects the increasingly fragmented nature of consumer markets. The rate at which consumer markets are fragmenting and morphing seems to gathering speed. The use of futures thinking techniques, such as trends is cited by interviewees as an effective approach for dealing with such rapid and continual change. Respondent SB elaborates:

Due to the kind of fragmented nature of consumer markets as well there are many more niches than there ever have been and I think that people are zooming in on one particular niche and trying to fulfil the needs and wants of that niche. They're trying to understand the big picture and trends is a great way of taking a snapshot of all the kind of things that are going on out there and saying, okay, this is what's going on, are you addressing gone or more niches? what's the big picture? and then having done a kind of a broad, a kind of shallow evaluation of the context, it's then to choose the direction carefully and I think, for our clients, what they're interested in is getting to an opportunity first and they get there protecting it. (SB_03)

As ever the translation of trend based information into something meaningful that clients can engage with and understand the inherent value to their operations is a key demand placed upon designers working in this area. One interviewee stated that designers have 'this instinct on how to bring it [trends based information] into a material or interactional or some other kind of story of engagement. Instinctively everybody knows how to draw down the meaning of it into something that can be constructed or used' (SB_04).

As noted previously, this translation of future based knowledge into actionable and meaningful data is a core competency of design. The translation of such information into something meaningful that can be articulated to organisations was identified by another interviewee:

What I've been doing for the last ten years is really looking at consumer trends, and working with clients to think about how those trends might impact on their business

overall, but also helping them to stimulate innovation, so using them in a very functional way, really to inspire them to get them thinking about the future. (LH_01)

Where organisations are operating in fast moving consumer markets, such as mobile phones, the challenge faced by researchers increases exponentially. The rapid changes, combined with the niche-niche fragmented markets, present multiple challenges for future oriented projects. The increase in touch points that need to be incorporated into the thinking required to establish a research methodology, aside the multiple inputs evident within the market, is a complex challenge. One respondent elaborates:

When you think about the research that our consumer phone side has to do, that's a lot tougher because they're selling individual phones, they have to appeal to demographics so they have to do a lot more ethnographic research. I guess the ethnographic research is about defining a demographic, what two Latino boys aged, sixteen to twenty five, what do they like, who are their influencers, who helped them make purchase decisions. That's a lot of research, expensive research, long term research, and it's up to interpretation. (GM_14)

Researching, synthesising, translating, and communicating an appropriate strategic direction within this complex environment needs to draw upon many resources to provide a rigorous direction. One interviewee noted the success in this approach:

One of the nicest things I've ever seen actually from this point of view was something that I was given from M&S about five years ago where somebody mapped out the next ten years and it looked at everything, it looks at the past as well, so it'll look at in turn technology, at convenience, and it's interesting because they've implemented almost everything that's in this document. I've always been really inspired by that as a way of joining the dots. It's a way of kind of taking things in each in turn and then, it's like an equal's sign, what does that mean for you as a brand? (KS_06)

The need to deal with multiple inputs in a rapidly changing environmental context means that design organisations need to be constantly developing, adapting, and refining approaches to deal with this level of complexity.

The substantive factors associated with this theoretical category are denoted below:

Theoretical category	Substantive factors
Many inputs, multiple variables, continual change (4.6.2)	Huge list of variables to consider; multiple perspectives; culture as an accelerator; fragmented nature of consumer markets; draw down the meaning into something; past informs future; joining the dots

Fig. 4.6.2 Substantive factors associated with the theoretical category 'Many inputs, multiple variables, continual change'

4.6.3 Theoretical category: *Evidence based direction, research underpins actions*

The increase of futures thinking approaches being employed in design is mirrored by an increase in the use of design based research activities to assist and inform the design decision making process. Research methods such as ethnography, cultural probes, unfocus groups, body storming, camera journals, user profiling, day in the life studies, and empathy tools demonstrate the myriad of ways in which designers have appropriated, augmented, and developed bespoke research techniques that assist in front-end design activities. These research activities inform future direction within projects (and organisations) by utilising evidence to underpin decision making. As one interviewee noted 'research is producing the catalyst' (AR_04). They go on to add:

We would start off by doing focus groups to then analyse the current situation and get all those needs, desires and all that kind of thing. This is really useful but consumers don't necessarily know what they want so from that perspective we're looking to social-cultural trends. And from that we'll start looking at category-contextual segmentation and try, from all that data, to create a strategy. Then from the strategy we create the language, the philosophy, and that would be the process for something that's very standard. In our process, the types of research we're doing goes from desk to field. (AR_03)

The combination of secondary and primary research, direct engagement and observational approaches, is synthesised to provide a rounded picture of user centred and socio-cultural trends. Interviewees provided a number of terms to describe this approach of understanding the context of the design undertaking. Respondent KS observes:

We're fairly unique in the way that we do put a big emphasis at the start of the process and that's probably my influence and my team's influence in terms of actually really understanding the brief, really understanding who we're designing for, who the competitors are. We call it the context of that and setting that really clearly, and then the initial design concept, the design development, the detailed design drawings, the CAD drawings and everything else, all them kind of follow on from that. (KS_03)

Organisations have developed many, and different, approaches to planning the research and design engagement at the front end of future oriented projects. One interviewee describes the process as:

Sifting through a huge amount of information, and coming up with hopefully a clear idea of what we need to do to cut through it all. Seeing a solution that takes them a way through, or seeing a rationale, or seeing methodology that will help come up with insights. (SR_03)

Another interviewee details this process as identifying 'the golden thread to the user' (WN_10) where the design brief is designed where the parts of the product specification are identified and converted into a form that the design team can work to.

The use of specialists within the design team that may have developed particular skills that assist in the early stages of the research and development process to provide evidence to support decisions was noted. Specialists in trends or consumer insight for example, are employed to drive the design team forward by providing evidence to underpin decision making in future oriented projects. This viewpoint is confirmed by respondents:

You've got the more forward-looking view where we would really see that type work being done by the trends team, and then there's the insight work of the here and now, work that the consumer insight specialist would conduct. Some people are better at different things so sometimes its interplay between looking forward and looking at what exists now or even looking forward and bringing stuff back and testing it in the now to see how it resonates with people and how it's understood, and whether it triggers some behavioural response. That's again quite a powerful but very complex process. (SB_09)

The development of trends based research competencies within design organisations complements more well established research approaches. The increasing use of such futures thinking approaches, as embodied in trends activities, enables organisations to deal with increasing complexity and meaning in culture, an area that traditionally designers have relied upon their intuition. Formalised methods are now more prevalent in design organisations and include such competencies as semiotic analysis in the context of cultural theory. These methods draw upon areas of the social sciences and are adapted to suit the needs of design and development projects. This is expressed by one respondent thus:

There is a strong tradition here, at least in product consultancy terms, of behavioural or ethno-methodological research and as much as trend's always been a part of what everybody did and used to be distributed across lots of different projects and now it's more of a function, but that's younger here culturally, than the behavioural stuff. One of the ways we use it to be complimentary to each other is to say, we understand individual behaviour and mass behaviour. Sometimes we say one is about depth and one is about breadth and you need both things, and there's a growing language of how they can be complementary. Where they come together always, is in culture and what meaning is inherent in culture for people to generate ideas of value and the kind of central method is discursive and semiotic analysis. (SB_09)

Group interaction is important in the development of insight based upon primary research activities. Within these team based situations, individuals discuss their impressions and thoughts as a means of externalising their thinking, identifying common perceptions, developing synergies between team members thoughts, and proving a means to develop tangible insights that can be communicated to clients (or other members of the team). One interviewee describes field based primary research and analysis activities:

Speaking about it afterwards and sharing impressions, reveals a lot of inspiration at the same time. So you go with two or three people, and everybody has their thoughts and you speak there, but also, you come back to the room and say, hey, you know what was interesting, what I felt there, what occurred to me there, then the other one saying, Yeah,

yeah, you know it's interesting, I felt like the exact opposite or something like that. All of a sudden you get to a piece of inspiration that's quite solid, that you might be able to write down and communicate to the client. (PR_08)

Expert opinion, particularly in specialist, extreme or sensitive subject areas, is utilised to illicit information that can't easily be accessed by other means. One respondent observes:

In particular projects, we might get a consultant that you don't just interview but rather get in to be part of the team for a longer time. I think we did do that on projects that were very, very particular, very subject-specific, maybe very sensitive in the subject. That might be an example where we say, All right, we get an expert from that area to sort of like, work with us, or go along a period of time, to give the right perspective or do things that we work things out. With extreme subjects that tend us to get experts in. (PR_13)

Design teams can draw upon this expert insight in an attempt to understand the context or individual perceptions that otherwise would not be possible. The development of empathetic research approaches assists in the understanding that is needed to underpin decision making.

Market and technology based research and development approaches employ techniques that attempt to align technological possibilities with market needs. Respondents elaborate:

I've got these new technologies, I've got this new business opportunity, I want to understand will this technology work for me, how can I make it work for me, so I want to do this exploration around this market, or this technology. That can be a couple of months of investigation or that could be like a year and a half of investigation ... is the de-risking technology for markets. (GM_03)

It's making sure technology suits the market, making sure the application suits the need. We see it so many times with clients or people coming in here with the best idea in the world, and you're thinking, That's great, but is that actually what people want? Lot of the time, No, it's not because it's the wrong technology for the wrong application. (TT_17)

The alignment of technological possibilities with user acceptance, or the acceptability of progressive design with the expectation of consumers requires designers to perform a balancing act that recommends progressive proposals that will be acceptable to consumers within the marketplace.

The link of progressive thinking to strategy development, without being too advanced such that proposals are not acceptable, was noted by a number of respondents. They stated that there was no set pattern or process for developing future oriented proposals although the end goal of the project was often well defined. Organisations develop proposals for future oriented projects and use them in the latter stages of the project to gauge consumer understanding and potential acceptance patterns. Respondent stated:

We'll do a research study and we'll often go right the way through to ideation to show future opportunities. Briefs tend to be very loose and very open. We don't work to anything that's particularly concrete. There's normally an end goal, but how we reach the end goal or what are produced can be very diverse. (AR_03)

Design organisations undertake research to understand consumer attitudes and behaviour to a particular technology, service, or product and utilise this insight to trigger and underpin decision making both in advance of commencing projects and within the design and development stages. Organisations track consumer trends (as identified, trends are the manifestation of attitudes and behaviours) and can be analysed to gain an understanding into areas of interest. Trends help organisation to understand changes that have been bubbling under for an extended period of time and can harness this understanding as a whole, or selected parts of, identified movement. Respondents elaborate:

Trends kind of cluster and sometimes trends cluster in different pockets around the world at the same time, which is like these zeitgeist moments. But what trends do is show us the end results of something that's been happening sort of invisibly for years prior. So the trend is the outcome. So a trend is the materialisation of a process. (JL_07)

We see all these way out trends and then working out how is it appropriate for our business. You don't necessarily have to use a trend entirely, you can mix trends, you can use trends as literally an accent on to your focus, so they can work in different degrees and at different levels. (AR_16)

Visual trends are also hugely important to design organisations as this may be the manifestation of wider cultural shifts. The combination of attitudinal, behavioural and visual trends acts as the nexus for trends in design. It is the combination of these three elements that design utilises to draw out specifics that are not evident within other sectors. The combination of these trends are translated by designers to provide unique insight and understanding crucial for future oriented design projects. The identification of patterns, drawn from attitudinal, behavioural and visual trends, can assist in clarifying how a particular insight has been generated. This is confirmed by respondents:

Another thing is trying to weight the pattern so you can say if you think it's an emerging trend or it's got longevity or it's just something that we don't think is going to stick around that long but it's worth mentioning. (MK_06)

As designers have well developed visual awareness and are sensitised to shifts in material culture, they can utilise this sensitivity to identify visual trends that are emerging across moiré than a particular product range, sector or market. Respondent MK supports this below:

So the way that I do it is I have a few folders set up that are visual inspiration and I won't try and categorise anything, I keep everything completely mixed together. ... Something just comes to my mind sometimes where I've seen two or three things that relate It always helps to give it its own identity to maybe say we've noticed these things emerging in

different products so I quite like to mix. If we've noticed some things, for instance, a certain material or something that's being used I try and reference it across a piece of automotive, a product, a bit of architecture, and a bit of fashion to make it more robust and something that's more than a fad. (MK_05)

The combination of attitudinal, behavioural and visual shifts, changes, or movements come together to create design trends. Design trends enable the communication of underlying movement that are complex and often represent deep rooted changes. Design organisations may use these design trends to signify a particular insight that can be harnessed to ensure that a robust strategy is developed. Communication of such trends was noted by respondents to be challenging and problematic, particularly when design teams are extended or collocated.

An air of caution was evident with some respondents as they felt that research activities such as trend analysis were being too formalised, stating that 'We tend to over-process things. We tend to try to make a science out of it. It shouldn't be that way' (PR_08). Although not all respondents raised this concern, the innate ability of designers to utilise their intuition and gut-instinct is still prevalent within creative undertakings.

The use of research to underpin and inform decision making of future oriented design projects, utilising a wide range of research approaches, help organisations to build a case for resource allocation. Although not all projects are successful in themselves, the learning that occurs through this process is valuable as this assists organisation to develop an understanding of how best to undertake future oriented design projects, the mechanisms that can assist in decision making, and how to draw out consumer attitudinal and behavioural perceptions to progressive design-led proposals.

The substantive factors associated with this theoretical category are denoted below:

Theoretical category	Substantive factors
Evidence based direction, research underpins actions (4.6.3)	Research underpins and shapes front end activities; understanding behaviour; group based research; aligning research outputs with design intent; trends = materialisation of underlying tendency; reference trends across sectors; internal communication of future oriented issues

Fig. 4.6.3 Substantive factors associated with the theoretical category 'Evidence based direction, research underpins actions'

4.6.4 Theoretical category: *Concretisation: making tangible, actionable and implementable*

Many organisations are intensively curious about the future but few have exactly the right resources or knowhow to conduct a design forecasting experiment that combines pure speculation with informed prediction. Speculative future concepts are often positioned far ahead of the market reality and generate new thinking and are a form of

to experiments that enable organisations to learn both about themselves and potential markets. Such projects are not just about making new things for their own sake but are chosen to provide the opportunity to explore new areas.

The visualisation and storyboarding of possible futures can be approached in many ways, from sketches to stories, or prototypes to movies. It may entail visualising or storyboarding user scenarios with fictional characters and involve design expressions of anticipated user behaviour. The visualisation of potential future concepts enables design curiosity to be made tangible such that others can engage with, and respond to, these visions of the future. Respondents conform this position and elaborate below:

How do we develop tools to visualise the future? Well there are some basic premises that we use. One is that visualising complex data helps simplify and helps people to see patterns and therefore helps them see what the future could hold. So this is a bit of 'If we build it they will come type work'. So it's a question of more about a great practical approach to making the future the way you want to see it. So in that sense we're showing them the future, we're visualising it. They go 'Wow, that could be the future' I'm going, Yeah, and then the next one could be this. You see? And then by taking it to that level of visualisation, and also being able to talk to them about how you can technically achieve that, they would say, 'Ah, yes, this is a vision of the future I can buy into, therefore I will make that happen'. They have the power to do it. Sometimes you just need to give them that. (SR_14)

Envision projects are working out where things are going, particularly in the next five to seven years? We do work in different timeframes but the envision work tends to, that seems to be the sweet spot for it. So we're really working out how different technologies are converging, where are some consumer trends going, and really, out of all that, what are the application concepts. So we're helping them (clients) visualise a future that they can then put a roadmap in place to get there and part of that is getting tangible things into their hands, that they can hold and help them really imagine what this future could be like and help socialise it through the organisation and communicate it to shareholders, or whatever they need to do. (LW_03)

The use of visualisations of the future to empower clients to make the future happen as it places tangible objects (or experiences) into their hands, providing them with the impetus to roadmap a path to that future. Design can develop what technology allows into concrete and specific proposals and provides shared visions such that clients can 'find ways of getting them [clients] to say, Oh yeah, I can see how that could be. They need to have those I see moments in order for it to be useful' (LH_05).

Interviewees stated that design organisation benefit from undertaking future oriented projects as they develop competencies in this area, provide materials for marketing purposes (as client projects may be confidential), showcase talents, builds credibility, develops processes and methods, and provide a creative outlet for designers. Design organisations may decide to undertake internally generated project so they can promote them to draw in clients for such projects. A respondent expands upon such issues below:

There are two very good reasons why we undertake projects that are conceptual futures facing for our own benefit, not just for a client. One is for marketing purposes. It's always great to show what you can do, you don't always get the kind of licence to do that on, not projects that are kind of grounded in reality. Such are the kind of lead times on the projects we do and particularly with some of the trends driven projects, not all of the proprietary work that we produce, is carried through so it's quite difficult to ever get into position where you can show that ... We also use them to demonstrate how we're shifting into new areas that not only makes a statement about where we feel things are headed there, but also demonstrates some of the processes that we've recently acquired or put into place or developed. (SB_19)

Design organisations also develop client facing services that may present some of the research activities that they have, utilising sample works or examples of the research activities, to convey the type of services they offer. One interviewee described this process (which they termed Extract) as being effective in educating clients about the type of future oriented services they had developed, and to tap into new clients who traditionally may not have bought design services. This allows clients to then buy these services as part of a future project as appropriate as credibility has been established via these demonstrator examples. SB elaborates thus:

Extract was intended to show people little snatches from our trends bank. To be honest with you, it's a marketing tool. ... The trends thing was something which we needed to build an awareness of, develop a credibility in, and Extract allowed us to do that very quickly and effectively. (SB_22)

Extract was effective in terms of getting our clients involved in an understanding of what trends means and where we look and how we make sense of trends. It's a really great way of doing it. Also it allows us to get a better feel for who is buying trends because it isn't necessarily the conventional design buyer. (SB_22)

Being able to build credibility and demonstrate capability in future oriented activities in a way that is commercially viable, as well as being implementable was noted by a number of interviewees. One interviewee reports, 'When we're applying trends, we're applying them in a way which is commercially, applicable and it's also doable. We can appraise the implementability and make clients aware of the issues' (SB_05).

The translation of future oriented design concepts into tangible elements should also consider the reason why such proposals are being put forward. One interviewee identified traceability of concepts as needed when communicating to clients:

When we come to translate, some of the need is for everybody to see where all these rather abstruse concepts come from, their traceability. We sometimes say DNA, we sometimes say conceptual components. Behind it all clients always wants to know, even when they're brilliantly happy with the end results, is what's that based on, or where, how, what's the link? So translation is just getting from that kind of inspiration to the object or experience but it also serves to be the way we do it here, a route back for the client as well, which I think is becoming increasingly important. (SB_07)

The manner in which concepts are researched and communicated is increasingly becoming dependent upon online and digital technologies. These approaches are being employed to communicate with potential consumers or end users but also to illicit responses from target audiences with regard to their impression of future oriented concepts. Digital technologies are enabling this two way conversation, between design organisations and potential consumers, and enabling an interactive dialogue to develop. By excluding a researcher from this process, the results that can be obtained are often more considered and reliable. One respondent elaborates:

We're going a lot online actually. Increasingly we're going a lot online and doing blogs and diaries online because, certainly with stuff like new product development or, say if there's a new product out there that's at a prototype phase, then we might leave that with consumers for a week and get them to just write a daily diary on what their experiences of using the product are. That feels really useful, really real, and allows us to get inside people's lives without being too intrusive. Sure, there are factors like people writing about it but it does allow people to consider as well, consider their response, which sometimes you can't get in an interview during a visit. People want that extra time to really think about what they're saying and they can kind of reduce it down to a single thought sometimes which is quite nice. (RH_11)

The visualisation and communication of future oriented projects undertaken by design organisations is a key aspect of the overall process of the increasing use of futures thinking in design. The actual mechanisms by which concepts are being visualised and communicated continue to develop and is increasingly embracing digital technologies to facilitate this process. Designers engage with these type of projects as they provide a forum for creative exploration, visualisation and communication of the future. 'People love doing them because they are usually very creative and the team can get quite excited with how it works' (SB_19). When speculative projects are well executed you could be forgiven for thinking that the future has already arrived as they provide designers glimpses of our future.

The substantive factors associated with this theoretical category are denoted below:

Theoretical category	Substantive factors
Concretisation: making tangible, actionable, and implementable (4.6.4)	Visualising helps to see patterns; buy into vision of the future; futures concepts = marketing, demonstrate competencies, and build credibility; traceability; confidentiality; commercial applicability, doable, and appraise implementability; engage potential consumers; more about images, less about words

Fig. 4.6.4 Substantive factors associated with the theoretical category 'Concretisation: making tangible, actionable, and implementable'

4.6.5 Summary

This section has discussed the proposition 'Futures thinking approaches are increasingly being employed in design' and empirical evidence has been presented to substantiate this

proposition. A key driver of this change has been the move up the food chain of design in which its engagement with strategic decision making is now more prevalent than it was a decade or so ago. Other factors that impact with this proposition include the opening up of research possibilities enabled by technological developments; rapidly changing and complex consumer markets; the increasing use of an evidence base to underpin research and research findings; the recognised ability of designers to make tangible manifestations of the future and their value to decision making; and the greater understanding of futures thinking approaches in industry and their increasing prominence in strategic decision making.

Within this section, empirical evidence has been presented that substantiate the research proposition, namely futures thinking approaches are increasingly being employed in design. The theoretical categories and substantive factors related to this proposition are denoted in figure 4.6.1:

Theoretical categories	Substantive factors
Increasing use of futures thinking approaches in design (4.6.1)	Non-creative pitch and change in design; research leading rather than supporting; increasingly complex development landscape; design-led focus; move up food change – strategic engagement through design; split between design and strategy
Many inputs, multiple variables, continual change (4.6.2)	Huge list of variables to consider; multiple perspectives; culture as an accelerator; fragmented nature of consumer markets; draw down the meaning into something; past informs future; joining the dots
Evidence based direction, research underpins actions (4.6.3)	Research underpins and shapes front end activities; understanding behaviour; group based research; aligning research outputs with design intent; trends = materialisation of underlying tendency; reference trends across sectors; internal communication of future oriented issues
Concretisation: making tangible, actionable, and implementable (4.6.4)	Visualising helps to see patterns; buy into vision of the future; futures concepts = marketing, demonstrate competencies, and build credibility; traceability; confidentiality; commercial applicability, doable, and appraise implementability; engage potential consumers; more about images, less about words

Fig. 4.6.5 Summary of empirically derived substantive factors and theoretical categories for the proposition 'Futures thinking approaches are increasingly being employed in design'

4.7 Chapter Summary

This chapter used an analysis of the interview data to present the findings in the context of existing literature in the field and in response to the research propositions. It has described how the empirical data has been analysed in relation to the research propositions and patterns explored from which categorisation of the data has produced a

number of theoretical categories and substantive factors relating to each of the research propositions. The next chapter will describe the use of this analysis in the development, validation, and refinement of a design futures framework.

05

Design Futures Framework

5.0 Introduction

The main objective of this study is to investigate the role of futures thinking in design. This chapter describes the creation of a design futures framework, its testing via a series of validation interviews with industry experts, its development, and refinement. Having reviewed the literature, theoretical categories and substantive factors, the author reassessed this material to formulate a number of elements of a design futures framework.

The term framework is used in research to denote various concepts and approaches. The following definitions of framework provide a theoretical basis for its use:

'An essential supporting or underlying structure.' (OED, 2002)

'A structural plan or basis of a project; a structure of frame containing something.'
(Harper Collins, 1995)

A framework is often used in research to connect aspects of a study and provide coherence to empirical inquiry. It aims to make logical sense of the relationships of variables that have been deemed important to the study. Often a collection of interrelated concepts, a framework is not so well worked-out as a theory (Borgatti, 1999). In this thesis, a framework is being employed which provide visual representations of the findings that (i) can be used to validate the findings within interviews with experts (see Crilly et al., 2006 for a discussion of the use of research diagrams as interview stimuli), and (ii) communicate the findings to stakeholders and beneficiaries. This approach seeks to provide coherence to the research and make sense of the findings.

The framework represents the research data in a visual form that expert interviewees (designers and design managers in this instance) can understand. As Crilly et al (2006) state 'This approach may yield contributions from interviews that are difficult to achieve by verbal translations alone'. As the empirical data was qualitative, i.e. words, the translation of this into a visual form was undertaken to support the elicitation of knowledge from experts (Cheng, 1996). Tabulated information could have been used but due to the developed visual literacy of the experts, a visually rich communication approach was adopted. Visual consistency was employed to provide structure to what was in some instances, abstract and counter-intuitive concepts. Consistency was also employed to attempt to gain credibility of what may have been perceived as *academic research* with the expert interviewees – all experienced design practitioners.

Fig.5.0 provides an overview of the research approach used to develop the design futures framework. A five stage approach was adopted:

- 1) Iterative and visual exploration of substantive factors through mappings and visualisations
- 2) Creation of four initial framework elements
- 3) Testing and validation of 2) with recognised experts in the development and application of design futures
- 4) Refinement of 2) in response to 3) to create four final framework elements
- 5) Mapping and cross-referencing of 4) to the six research propositions

The five stages involved in the development of the design futures framework identified above will now be discussed individually in detail:

- 1) The substantive factors derived from the analysis of the research interviews were explored to identify patterns that may underpin the design futures framework. By visually exploring the substantive factors, relationships, and the design process, a number of potential ways to structure the information were identified. Through a process of experimentation and iteration, a number of clusters of substantive factors were drawn out. This differed from the categorisation developed via the theoretical categories as the research data was not organised against research propositions. The potential approaches to organising and refining this information were explored with reference to relevant literature in the field, the aim of the thesis, and the specific research questions, findings made explicit through this research study, and the tacit understanding of the author developed through this research and a decade researching in this field

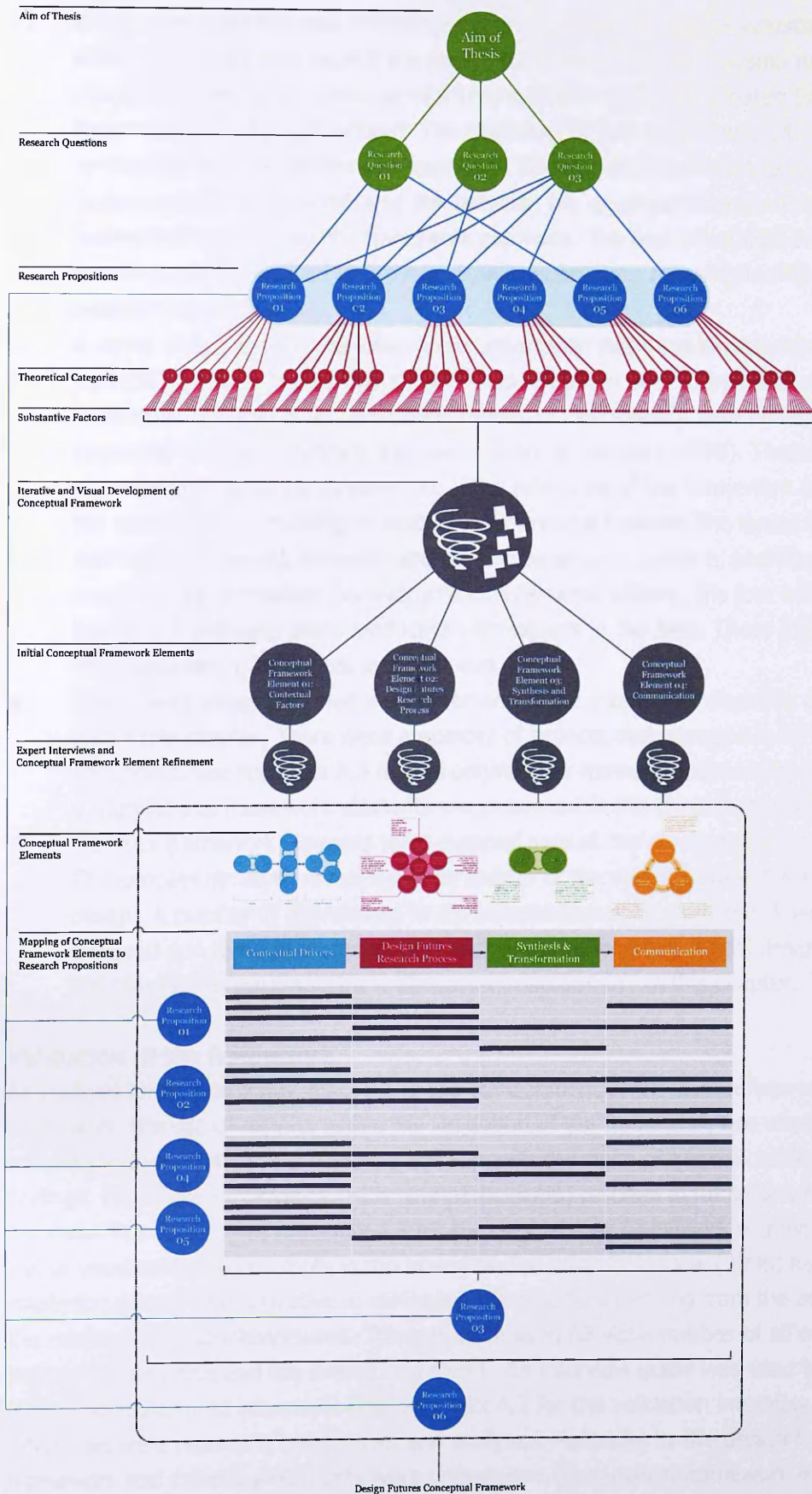


Fig. 5.0. Design Futures Framework development process

- 2) An iterative approach was utilised which underpinned a series of visualisations which sought to make explicit the design futures framework. By using iterative and visual mechanisms, an initial set of framework elements were created (see fig.3.12 for an example of visualisations). The clustering of information was ultimately synthesised into four framework elements. The translation of the substantive factors provided a demonstrable link between the empirical findings from the research interviews and the framework elements. The four initial framework elements were visualised to provide visual triggers for a meaningful discussion with experts in the field.
- 3) A series of four expert interviews were undertaken with nine participants (see fig.3.13 for details of participants) who had not taken part in the initial series of interviews. The use of visual representations of the research data aimed to focus discussion around a common framework (Ford & Sterman, 1998). These interviews aimed to illicit participants views on: i) the relevance of the framework elements to the role of futures thinking in design, ii) differences between the issues identified within the framework elements and their experience in practice, and iii) any errors, omissions, or anomalies. Semi-structured interviews utilising the four initial framework elements were conducted with experts in the field. These interviews were recorded, transcribed, and analysed.
- 4) Participants' views informed the refinement of the framework elements discussed within this chapter. There were a number of aspects that changed in light of their comments. See appendix A.3 for the original four framework elements. The final design futures framework elements are presented in this chapter (sec.5.1-5.4).
- 5) The four framework elements were mapped against the six research propositions. This process aimed to reveal a clearer picture of the role of futures thinking in design. A number of approaches to the visualisation of the framework were explored and through a process of iteration and refinement, a final design futures framework was created. This is discussed in section 5.5 of this chapter.

5.0.1 Validation of the framework

As outlined in the five stage approach to the development of the design futures framework, the use of experts within the validation of the framework was essential in ensuring the reliability of the research and supports the claim of generalizability of the findings. Four expert interviews (with nine participants) resulted in numerous revisions to the initial framework (see appendix A.3 for the original four framework elements). The use of visualisations as prompts in the interviews, or what Crilly et al (2006) term *visual elicitation stimuli*, were effective in conveying the resultant thinking from the analysis of the research data to interviewees. This approach used A3 visualisations of all of the framework elements and the overall framework. An interview guide was used to support these semi-structured interviews (see appendix A.2 for the validation interview guide). All interviews were recorded, transcribed, and analysed. Revisions to the design futures framework and individual elements were undertaken. The revised framework is presented in this chapter.

5.0.2 Changes made to the framework as part of the validation process

The four expert interviews provided a mechanism for revision and validation of the design futures framework. A series of visualisations of the initial framework as well as supporting information such as an overview of the research, research questions, research propositions, and a biographical note outlining the authors' background were included in the materials used as visual prompts in the validation interviews. Participants were able to interact with the visual elicitation stimuli within the validation interviews. In some instances interview participants amended the visual elicitation stimuli by marking them up with additional diagrams and notation. This was voluntary and was neither encouraged nor discouraged by the author but provided a means to explicitly understand where participants felt changes to the framework were required. All four elements of the framework were revised in one form or another as a result of the validation interviews. The main changes are summarised below:

- There was general agreement upon the main aspects of the framework and their relevance to the design futures framework. As one respondent stated

It feels that if I was going to write a process in terms of how it should be done I think I'd put them in this kind of order. This would be the kind of a process that we would be talking about. ... It rings true. It feels incredibly like a pitch. (V:SB_08)

- Respondents noted that the relationship of some aspects of the framework could be refined to make explicit the hierarchy of elements. In particular the Contextual Factors element (Fig.5.1) of the framework was identified as an area for further attention. As one respondent stated 'It's not that any of these are individually wrong, just the way you're organising, it probably could be clarified' (V:KM_17). The development of three overarching aspects within the Contextual Factors element of the framework resulted from identification of drivers and barriers to the adoption of futures thinking in design. Specifically, one respondent stated

Are these drivers of the rise of design foresight? The rise of future thinking and design or something, and then these are then different, almost drivers of that. ... That's definitely the most important one. It might be worth you splitting these into different things actually. (V:KM_17)

In response to respondents comments, the Contextual Factors element of the framework was restructured to include three aspects, namely i) drivers, ii) barriers, and iii) design dimensions to the use of future thinking in design. The design dimensions aspect of the framework was denoted to ensure that the desirability (human perspective), feasibility (technological perspective), and viability (business perspective) of future propositions are considered explicitly within the framework.

- The specific focus of individual aspects of the Design Futures Research Process element of the framework was refined. For example, minor changes included: utilisation of non-design research techniques (rather than utilisation of marketing

techniques); tracking of trends and movements in behaviour (rather than simply trends and movements); and understanding socio-cultural context (rather than simply socio-cultural context). The intention here was to make these elements active by providing how these elements should be considered by design. Some aspects of this element of the framework were reinforced by respondents such as the need for instinct and intuition within the Design Futures Research Process element of the framework, specifically

We need to start getting a bit more vision and foresight back because people have got far too close to the minutiae of their consumers' lives which is always a rear-view mirror perspective really. Actually you need to step back from all that and start developing your own point of view in the future. (V:KM_17)

Intuition and insight drive nearly every project that we do. (V:RS_12)

- The Synthesis and Transformation element of the framework was divided into two specific stages after input from the validation interviews. This allowed a clear distinction between the two main aspects of the framework elements, namely synthesis and transformation. Synthesis was seen as a key competency of design futures and something that should be highlighted by designers. This is illustrated by one respondent who stated

I normally think that the key part of every project that we do is synthesis. I think that if we were going to talk about a core competency area [in design futures], it would be synthesis. (V:KM_19)

These two stages in the framework were divided to underscore their key contribution and importance. It was possible to associate secondary aspects with each of the stages. By providing clear distinction between these activities, it is possible to clarify these separate but inherently interrelated approaches.

- The Communication element of the framework was revised to illustrate the relationship between the individual factors, namely: i) communicating the future, ii) prototyping and visualisation, and iii) self-fulfilling prophesy. This resulted in a clearer relationship between the above three factors denoted by arrows. This intended to represent the two-way relationship between communicating the future, and prototyping and visualisation, and the way that the self-fulfilling prophesy is only informed by i) and ii). This is a one way not a reciprocal relationship.

The self-fulfilling prophesy of some design futures activities was once again reinforced by comments from experts within the validation interviews, specifically

All of the methods, whether its simple sketches right through to immersive things, to an extent it becomes a self-fulfilling prophesy. If the CEO of an organisation spends a lot of money on something for five, to ten years out, they then have that information to be able to use within the organisation to get people on board to make it happen. (V:SB_07)

This section has provided an overall summary of the changes to the design futures framework. It has not attempted to convey each change in detail but provide a high-level discussion of key changes. These changes were based upon analysis of the transcripts of the four validation interviews and, where appropriate, use of the revised and annotated visual elicitation stimuli.

5.0.3 Summary

The following section describes each element and the framework. Using all data the author redesigned a framework that represents a more accurate picture of the role of future thinking in design. The final section of this chapter (sec.5.5) will discuss the relationship between these elements, the six research propositions, and findings against each discussed in chapter 4.

Four framework elements were developed:

- 1) Contextual factors (sec.5.1)
- 2) Design futures research process (sec.5.2)
- 3) Synthesis and transformation (sec.5.3)
- 4) Communication (sec.5.4)

5.1 Contextual factors

This section discusses aspects of the contextual factors element of the framework, namely i) drivers, ii) barriers, and iii) design dimensions to the use of future thinking in design. It will describe the exact nature of these aspects and detail their constituent parts.

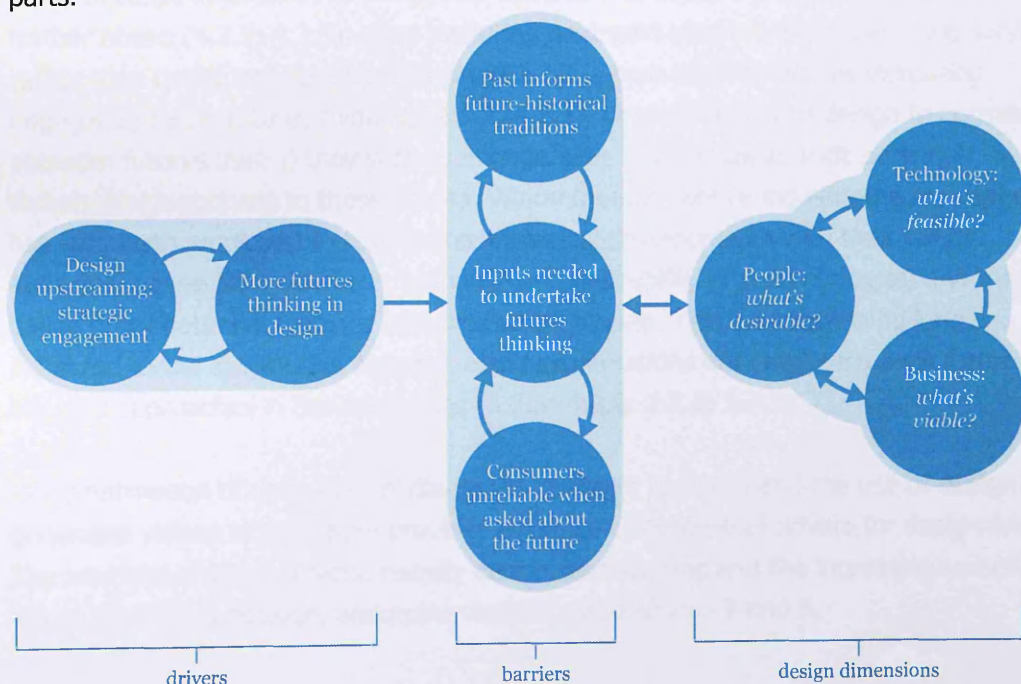


Fig. 5.1. Contextual factors element of the design futures framework

5.1.1 Drivers

The drivers for the use of futures thinking in design are: i) design upstreaming: strategic engagement and ii) more futures thinking in design.

Design upstreaming: strategic engagement: The findings of the study have provided evidence of the strategic use of design across a range of organisations (4.2.4; 4.6.1). Design is increasingly being used to assist organisations in the development of long term visions of future products and services (4.6.2; 4.1.2), as well as the broader application of design to address key challenges faced by organisations and society as a whole (4.3.4; 4.6.2; 4.1.6). Termed by some as design thinking (particularly Brown 2008 & 2008; Martin, 2009), the strategic use of design and designerly approaches beyond traditional design contexts is increasingly being undertaken (4.1.5). Traditionally design has been used as a professional service being engaged to execute a pre-determined project where the extent and focus of such projects had already been determined often by different business functions such as marketing or finance. Design was brought into the development process at a point where many decisions had already been made.

Design is now employed in the identification and definition of business objectives (4.1.5; 4.1.6; 4.3.5). This results in design being much closer to the strategic decision making, with designers approaches being used to assist in the actual decision making process (4.6.3; 4.2.4) (see Jozlasse, 2008) and gain competitive advantage. In this context design is moving upstream and closer to the decision making nexus (4.6.1).

More futures thinking in design: As a consequence of design moving upstream, the nature of many of the projects that it is tasked with addressing has changed (4.6.2). The more strategic application of design has enabled it to explore projects that are looking further ahead (4.2.5; 4.3.5), often exploring next-next generation products and services rather than traditional development projects. It is here that design has increasing engagement with futures thinking (4.1.2; 4.2.3). Organisations use design to consider potential futures that: i) they wish to engage with, and ii) how to illicit potential stakeholder responses to these visions. Within the automotive industry the concept car has long been employed to test out technological developments with their target audience, gauge both consumer response and desirability of such concepts, and then trickle down potential features into production models. This approach is no longer restricted to the automotive industry. Many organisations are employing such future oriented approaches in the businesses (4.2.3; 4.2.6; 2.6.2; 2.7.1).

The combination of design's contribution to strategic business and the use of design generated visions of the future provides evidence of contextual drivers for design futures. The interface of these drivers, namely design upstreaming and the increasing use of future thinking in design, underpins research propositions 2 and 6.

5.1.2 Barriers

In contrast to the drivers aspect of the framework discussed above, there are also barriers to the use of futures thinking in design evident within the contextual factor element of the framework. The barriers are: i) consumers are unreliable when asked about the future, ii) past informs future – historical analysis, and iii) inputs needed to undertake future thinking.

Consumers are unreliable when asked about the future: Consumer responses to ideas for new products and services are limited by their understanding of future states (4.3.1). As such, consumers are unreliable when asked what it is they want in the future (4.3.3). Awareness of opportunities made possible by developments in technology or business factors, can limit the openness and aspirations of potential consumers (4.4.2). There is evidence that consumers will follow what has gone before and only consider incremental changes in new products or services (4.3.3). In such instances, the past not only informs the future, it restricts thinking about it (4.1.3). Historical precedent can limit the vision of potential consumers.

Past informs future: In addition to shaping the thinking of consumers, history can limit the aspirations and creativity of organisations. By drawing upon the past to inform the future, organisations may be limiting their thinking (4.6.2). Often cited is the *we've always done it this way* idiom, new, novel, and unexpected trajectories can be blocked off if historical perspectives are fostered (4.5.4). In many instances, incremental developments will continue unless challenged. Designers are well placed to challenge existing paradigms as they have both training and experience in interrogation of existing situations (4.2.3; 4.1.6; 4.5.5). Armed with divergent thinking skills, designers are able to consider a wide range of future trajectories based upon an existing situation (4.6.3). It can be stated that the past informs the future in a positive manner without restricting thinking if designerly approaches underpin this process (4.6.2; 4.1.5; 4.1.6).

Inputs needed to undertake future thinking: A further barrier to design future thinking is that of inputs and triggers needed to undertake future thinking within design. As was identified in the preceding chapter, designers utilise many different triggers to underpin and evaluate the future thinking process (4.1.5; 4.2.1; 4.2.2). They range from secondary data drawn from a variety of sources such as market research, journals, magazines, etc. to focussed primary data collected in the form of ethnographic observations, interviews, experiments, and unfocus groups (4.4.3; 4.4.4; 4.4.2). Although extremely helpful, these triggers present a number of challenges: i) the resource cost required to collect such data (4.3.3), ii) the resource cost required to analyse, synthesise, and communicate such data (4.6.2; 4.6.4), iii) the time and expertise needed to gather such data is often beyond the scope and capabilities of many organisations (4.5.2), iv) the complexity and lack of guaranteed outcomes from such activities discourages organisations from even trying to undertake such a process (4.5.3), and v) near-time-horizon project demands often require immediate attention such that next-next

generation projects are always on the back burner (4.1.3). Although there are many challenges to identifying and employing appropriate triggers for future oriented design projects, the need is highly evident (4.6.1; 4.1.5). Without utilising appropriate triggers, organisations run the risk of limiting options due to the limits of their knowledge, understanding and ultimately imagination. Organisational culture can perpetuate unless it is challenged (4.5.4). To do this an evidence base is often required to demonstrate new approaches and opportunity areas (4.6.3). Inspiration cannot be guaranteed if no stimuli are introduced into the development process (4.2.2; 4.1.5).

Thus barriers are part of contextual factors indicating the unreliability of consumers responses when presented with new products and services, the problems associated with using the past to inform the future, and the need for inputs to help to trigger the design futures process. These barriers are evident within many future oriented projects even if they are manifest in different forms relative to the context of the particular project (4.3.1; 4.3.2)

5.1.3 Design dimensions

There are three interrelated design dimensions of the contextual factor aspect of the framework: i) people: what do people find *desirable* in future products or services? ii) technology: what is technically *feasible* in future products or services? and iii) business: what is *viable* from a business perspective in future products or services?

Much attention has been paid to identifying and uncovering people's unmet or latent needs, wants and desires (4.2.2; 4.4.3). As a human centred design activity, it goes some way to addressing the unreliability of consumers (4.3.1; 4.3.3). Rather than asking people what they want, designers use a variety of approaches to identify future needs, wants and desires (4.2.2; 4.4.2; 4.3.3). With these identified, design sets out to create future products and services that address these issues (4.5.4; 4.6.4; 4.2.6).

When engaged with next-next generation products and services, there is a need to create not only what is desirable, but what is feasible and viable (4.6; 4.6.4). Designers draw upon technological and business factors to assist in exploring these issues (4.3.2; 4.1.1; 4.1.5). If a wholly desirable product or service is developed without any regard for its technological feasibility or business viability, to a greater or lesser extent, it may be just a creative exploration (4.2.3). By considering all these design dimensions to an appropriate level and manner for each project, designers can create desirable, feasible, and viable proposals (4.6.3). It is within this sweet spot that the majority of organisations wish to operate (4.2.5; 4.3.4; 4.6.4).

Each of these three design dimensions inform and interact with each other in a variety of ways. A human centred approach demands a focus upon people and the identification of desirable features. In some organisations, technological developments may trigger the process, while a new business model may be the catalyst for a new design project. The

exact nature and relationship of these three dimensions is context specific and varies between organisations (4.3.2).

5.1.4 Summary

Drivers, barriers, and design dimensions form a series of contextual factors that underpin the design futures framework. While there may be challenges to address, such as the unreliability of consumers, or the past restricting approaches to the future, design can navigate this complex environment by drawing upon a range of research approaches appropriate to future oriented projects. The nature and interrelationship of the research process is explored in the subsequent section of this chapter (sec. 5.2).

This section has attempted to make explicit the contextual factors that demand consideration in future oriented projects as part of the design futures framework. The next section will present and discuss the second of the four elements of the framework, specifically the design futures research process.

5.2 Design futures research process

This section presents a range of research activities that combine to create a research process appropriate to design-led futures. It discusses the individual research activities and provides a commentary upon their use within the design futures research process, and their relationship to the overall framework.

There is no single design futures research process. As has been identified, organisational context and project specificity impact upon how design-led futures projects are conducted (4.3.2). This section aims to identify key factors that constitute a generic or underlying design future research process. It is not the authors' intention to present a definitive process that is appropriate in all contexts, rather identify the key factors relevant to the design future research process.

Drawing upon literature, theoretical categories, and substantive factors, as well as the tacit understanding of the research process employed in future oriented design projects (which the author has developed throughout the last 8+ years researching in this area), the design futures research process is presented (fig 5.2). This process comprises five critical research factors: i) understanding socio-cultural context, ii) tracking of trends and movements in behaviour, iii) utilisation of non-design research techniques, iv) designers use of intuition and insight, and v) gathering expert opinion. These five critical research factors will now be discussed in detail individually. This is informed by analysis of the interviews and the discussion of the research propositions.

5.2.1 Understanding socio-cultural context

An understanding of the socio-cultural context in which products and services are utilised is essential for future oriented design projects as this forms a basis for projecting visions into the future (4.1.6; 4.3.1). The one constant factor in all future oriented projects is people. The socio-cultural context in which future consumers utilise products and services must be considered when creating visions of the future for products and services (4.1.5). As time horizons extend, it becomes increasingly problematic if projecting technological or business based considerations (4.2.5; 4.1.1). Utilising an awareness of socio-cultural context can assist in the development and communication of human-centred understanding by projecting current day factors into the future. 'People are the only constant in the future' is a position frequently used in futures thinking and is wholly relevant in design contexts (4.2.2). By developing an understanding of how people will respond to a future situation, a number of reference points can be conceptualised (4.3.4; 4.3.5). These help to inform design activity.

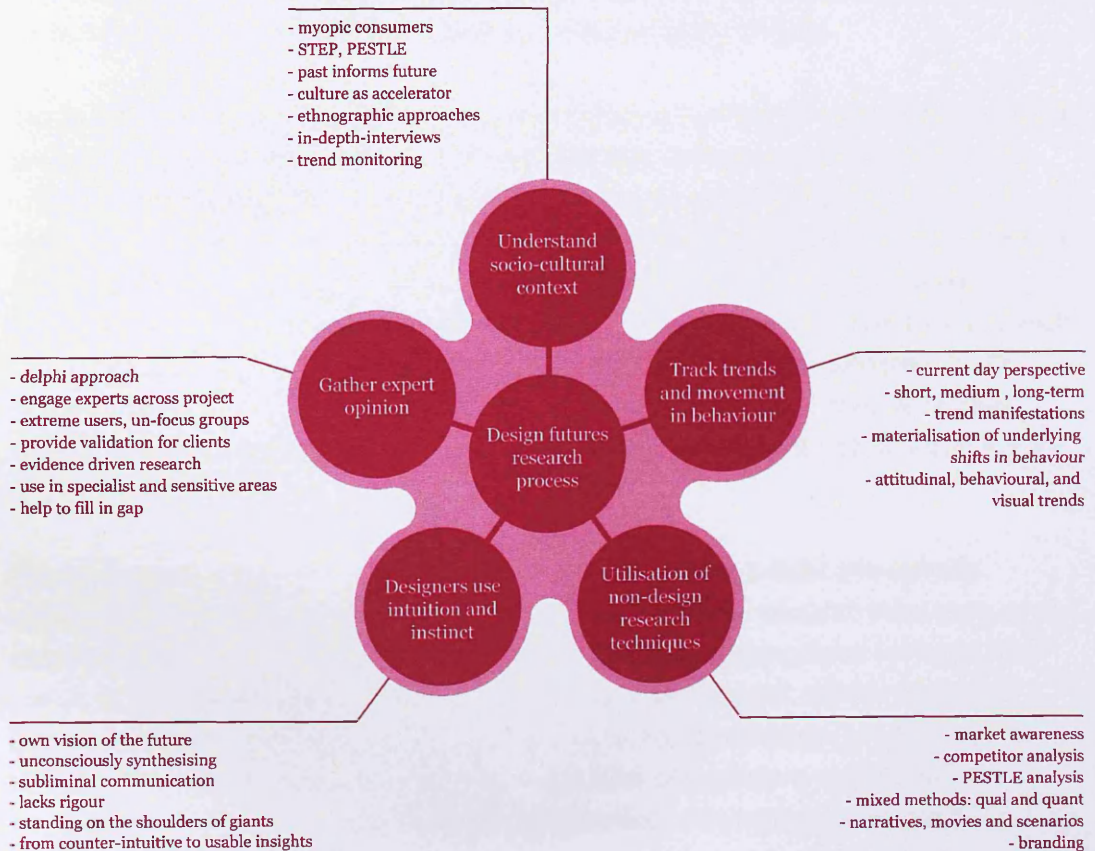


Fig. 5.2. Design futures research process element of the framework

Understanding the socio-cultural context draws upon a number of research tools and techniques. Standard environmental analysis tools such as STEP or PESTLE frameworks provide an accessible approach to structuring research data (4.3.4). Data sources vary between projects as context specificity shapes particular approaches (4.2.1; 4.5.1).

External agencies that specialise in environmental and socio-cultural scanning are often used to augment data collected and contained within an organisation (4.5.2). Primary data may be in the form of ethnomethodological observations or in-depth interviews (4.2.2). Participants may be target consumers or drawn from a broader stakeholder line-up that may include extreme or counter-culture viewpoints (4.2.1). This can provide an insight into early adopter views that lie outside those of the general public. These viewpoints can point to early warning signs that may become mainstream trends in the future (4.2.1).

Understanding the socio-cultural context appropriate to a given project can be undertaken by a range of actors, drawn from design specialists and research professionals (4.5.4; 4.5.2). Increasingly the democratisation of research in design, combined with developments in, and access to, digital technologies has greatly broadened the potential research base (4.4.5). For example, the use of online forums is growing in popularity in research phases of design projects. Often these approaches are employed to gather a broader data set but importantly the analysis of such data is still undertaken by professionals from within and beyond design (4.5.4).

Insight into socio-cultural contexts is communicated in a variety of ways, with no specific single approach prevalent. The use of visual mapping techniques, combined with an underlying framework permeates the majority of communication approaches (4.5.5; 4.6.4). Textual data is often kept to a minimum in presentations but is used to underpin and validate insights. Textual data, in the form of a social-cultural report normally accompanies such presentations. Respondents noted that this more traditional approach is deemed necessary by clients as, in their own opinion; it provides validation to the research process (4.3.4). Cited as a safety net in some instances, it may be used as evidence of the breadth and depth of research activity undertaken (4.1.3; 4.2.2; 4.2.3; 4.2.4).

Personal points of view are utilised to translate socio-cultural insight into specific instances (4.1.4). The use of actual quotations gathered from research interviews, or the creation of centre-line-personas is frequently employed in socio-cultural contexts. This can be in addition to trend monitoring and expert opinion. Expert opinion frequently utilises quotations to illustrate and reinforce a particular perspective (4.4.3; 4.2.1). In addition, the used of personal viewpoints in the form of quotations or personas are employed to negate the myopic viewpoint of potential consumers (as discussed in 5.1.1).

In summary, socio-cultural contexts draws upon a range of research techniques and within the overall design futures research process overlaps with, and draws upon many, research tools and techniques. As previously noted, there is no single research approach that dominates rather an amalgamation of a range of associated research approaches perpetuates.

5.2.2 Tracking of trends and movements in behaviour

Awareness of the current day perspective in any situation can inform future visions. Tracking trends and mapping out potential future trajectories helps to explore, monitor, and assess movements in human behaviour (4.2.2; 4.2.3; 4.2.6; 4.4.2). Respondents identified many ways in which they track and monitor trends that broadly fall into short, medium, and long term time horizons. As identified, sector development times impact upon the particular trend cycles but generally short term trends are between 1 and 3 years, medium term trends are between 3 and 7 years, and long term trends are between 7 and 10 years (4.3.4). The manifestation of trends varies greatly, and once again are project and sector specific. Where major trends are identified, for example user customisation, they can be tracked and identified across many sectors although their actual manifestation may be different. Trends are not created by trend spotters, rather they are identified. Techniques are employed to identify the early warning signs or weak signals of the trend (4.4.2; 4.1.5). The use of cool hunters – researchers who are culturally sensitive to these weak signals – permeates design forecasting. Organisations such as The Future Lab (a London based consultancy who undertake trends forecasting, brand strategy and consumer insight for the retail, technology, finance, automotive, food textile and fashion sectors) combine an in house team with a global network of trend analysts and ethnographic researchers (4.4.2; 4.5.2). Qualitative and quantitative insight into future consumers enables organisations to anticipate shifts in behaviour and plan accordingly (4.4.1). As the materialisation of underlying shifts in behaviour, trends can be used to capture new and emerging thinking (4.6.3; 4.4.2). Combined with observational processes (4.2.2), intuition is often used to propose new and emerging tastes and modes of thinking based upon identified trends (4.1.4).

In design-led futures, the research found that trends can be grouped into three trend aspects: i) attitudinal, ii) behavioural, and iii) visual (4.6.3). Attitudinal trends are concerned with our attitudes and ways of thinking; behavioural trends are concerned with our behaviour and what we do; and visual trends represent the visual changes to our material world. All three trend aspects contribute to an understanding of consumer behaviour.

Trends are often likened to the iceberg metaphor. Although a small portion is visible, there is much more underpinning its presence. In future oriented projects, designers seek to identify the small portion visible above the waterline and understand and harness what lies beneath. As the trend is the manifestation of more deep rooted changes in society, early identification of such elements can assist in developing a plan that accommodates such changes (4.1.5; 4.4.2).

5.2.3 Utilisation of non-design research techniques

Design is increasingly utilising a range of research techniques from other disciplines (4.4.1). Examples may include market research techniques from marketing, a range of ethnographic methods from the social sciences, and usability testing from computer

science. Within the context of future oriented projects, designers have embraced many research techniques from the marketing profession (4.4.1; 4.6.1). Environmental scanning approaches that provide market and competitor awareness are regularly employed to provide a clear and rigorous understanding of relative product or organisational positioning (4.4.2; 4.6.2). As noted in 5.2.2, this approach has been adopted by design to validate insights for clients. Additionally, some future oriented projects are commissioned by marketing functions within organisations rather than research and development functions within organisations. Thus the use of marketing research techniques is undertaken to *talk the same language* and create credibility for design organisations (4.6.4).

Well established business based research techniques such as SWOT analysis may be employed as a counter for more experiential creative research techniques such as the use of narratives of experience movies (4.3.4; 4.2.6). In such examples, design draws upon cinematography and associated disciplines to create immersive movies, often drawing upon *wizard-of-oz* techniques, to convey experiential proposal for new products and services. The use of such techniques can be employed as a research and communication tool (4.2.6); drawing in new data and insight in response to new concepts (4.6.4), or conveying proposals for new products and services to stakeholders (4.2.6). The use of techniques from the dramatic arts has been a long standing feature of futures thinking. Combined with designs creative leanings, this approach provides a powerful medium for researching and exploring the future (4.2.5; 4.6.4). In their seminal design-led futures project Visions of the Future, Philips created a series of mini-movies to communicate their various future visions for products and services 10 years into the future. As many of the technologies they were advocating were not available, a number of movie techniques were employed to create the illusion that their visions of the future were potentially feasible (4.6.4; 4.4.1; 4.5.5). Such wizard-of-oz techniques are valuable when exploring over the horizon technologies as it is possible to illicit consumer feedback upon future products and services (4.2.6).

In summary, non-design research techniques are normally combined with designerly approaches and as such augment, rather than replace, design based approaches. It is noted that where clients seek validation and verification of proposals for what are essentially visions of the future, techniques that they are more familiar with are often employed.

5.2.4 Designers use of intuition and insight

A key aspect of the design futures research process is the use of designers' intuition to explore and communicate proposals for future products and services (4.1.4). In many instances, intuition and gut instinct may be in direct opposition to research findings. It is in such instances that design brings something that is not easily quantified. The use of intuition may be an antithesis to current day thinking but as in the case of myopic consumers, it may be required to break out of existing paradigms (4.1.2). As previously

noted, the past informs the future and without creative leaps that are core to how designers think, incremental rather than radical proposals may continue (4.5.4; 4.3.3). The concern with the use of designers' intuition is often that it lacks rigour as it is not necessarily a demonstrable and replicable process. Confidence can develop between designer and client throughout a project such that when a gut instinct is put forward, which may be counter to research findings, a creative leap is taken and accepted. Many instances exist where designers have put forward proposals based upon their gut instincts that may contradict many other viewpoints (4.1.4; 4.3.3). As future oriented projects often require a leap of faith (as it may be impossible to rigorously research a particular future context) a combination of intuition and research activities is often employed.

It is not possible to provide broadly applicable guidelines for the use of intuition within future oriented design projects. Respondents stated that there are instances where gut instinct plays a central role in visioning the future but little concrete evidence was put forward with regard to how this may best be employed (4.1.4). As with previous attempts to explicitly understand all aspects of the design process, conclusions suggest that some aspects of designing are tacit and may not be fully rationalised (4.3.1; 4.5.1). Designers draw upon many tools and techniques, years of experience, and the views of other stakeholders to inform their design process. Serendipity can shape a design project in a way that no one predicted. What can be stated therefore is that although a generic design process can be presented, designers also use an internal guidance system to navigate each project. Some of this activity can be externalised, some cannot.

The use of intuition and gut instinct within the design futures research process may contradict research findings and can be seen as designers following a whim without any rational reason. Clients need to develop a level of trust with designers to feel comfortable supporting this approach. The use of gut instinct has been studied within the design process but much of this approach cannot be rationalised. Without gut instinct there is a danger that projects follow previous approaches and do not result in radical approaches (4.1.4; 4.3.1; 4.6.3).

5.2.5 Gather expert opinion

The use of expert opinion was noted by many respondents as a key research resource in future oriented projects (4.4.3; 4.2.1). Experts can be drawn from many backgrounds – from those closely aligned with a particular project or from a seemingly unconnected field. Expert input may be used to fill in gaps in knowledge within the development team as well as providing provocative viewpoints or counter arguments (4.3.3; 4.2.1). As the future may not be the same as today, extreme, controversial and challenging viewpoints are often included to create a breadth of insights and spark debate. Experts drawn from seemingly unconnected fields may provide input to a cognate process and identify modes of thinking, rather than subject specialism that align with the project under consideration (4.4.3).

One area that expert opinion is valued is in the use of extreme users. Such users represent a non-typical world view yet can provide highly relevant insights that, through development and refinement may be used in mainstream products and services (4.2.1). The outlier concept – people operating on or outside the edged of expected reason – is one that has been popularised in design in recent times (Kelley & Littman, 2006, Brown, 2009). Such approaches are termed by some as unfocus groups as they are the antithesis of mainstream focus groups (4.2.1; 4.3.3; 4.6.3).

Expert opinion is also used in specialist and sensitive areas where knowledge is particularly context specific. This may be an instance where the development team may not have access (e.g. in a nuclear plant), may not have the required skill level (e.g. a brain surgeon), or are not from the appropriate demographic (e.g. when designing for children). In all instances, the use of expert opinion is used to increase the knowledge and understanding required within the project (4.2.1).

Experts may also be used to respond to future proposals during the later stages of the design and development process. This can be at a specific point or a variety of stages. The latter approach may take the form of a Delphi oracle as well as less formal approaches. The use of experts once again provides clients seemingly with validation of proposals and support for decisions. Although in some instances this may be the case, expert opinion provides immensely valuable insight for the development team. It can assist in developing an understanding of complex issues that hitherto may not be accessed without their input. The use of expert opinion can provide access to a vast amount of data and can provide excellent value for money if employed in the correct manner (4.2.1; 4.4.3).

5.2.6 Summary

The design futures research process consists of a number of interrelated research activities that are undertaken throughout future oriented projects. It is seen as a self contained activity that is only visited once. Although a concise model is put forward, in reality a fluid and organic set of activities take place. The requirements of specific projects may result in certain aspects of the process being focussed upon or omitted. As presented the design futures research process may be interpreted as being self contained, but it feeds, and is fed by, the other elements of the framework.

This section has detailed the design futures research process, its constituent parts, particular scope and nature, and its relationship to other framework elements.

5.3 Synthesis and transformation

The third element of the framework is concerned with the synthesis and transformation of data to information, and information to insight. Within the design futures research process (sec. 5.2) data is collected in numerous ways from a wide variety of sources,

comes in a variety of forms, and is appropriate to a range of contexts within the design and development process.

Data may be drawn from a variety of sources and collected for a variety of reasons (4.5.1; 4.5.3) and can be both quantitative and qualitative. For example, organisations may provide design development teams with data they collected over a period of time for market research purposes (4.5.1). This data was not collected for the sole purpose of informing future oriented design projects and as such needs to be harmonised into a useful and usable form. Kolko (2007) claims that 'designers attempt to draw connections between seemingly disparate ideas; they examine quantitative data provided from marketing and qualitative data gathered from end users, and before they can begin designing, they must make order out of the chaotic mess of research'. Data needs to be translated into a usable form for stakeholders. The goal is to develop an understanding of the design opportunity that exists. The data that has been collected must be organised, analysed and ultimately understood. This includes a generative process for analysing data that is equally complex and messy (4.6.4; 4.4.5). This process is complex due to the disparate forms of data that it involves, and messy as there are no specific rules or fundamentals to follow. The synthesis and transformation element of the framework is denoted thus:

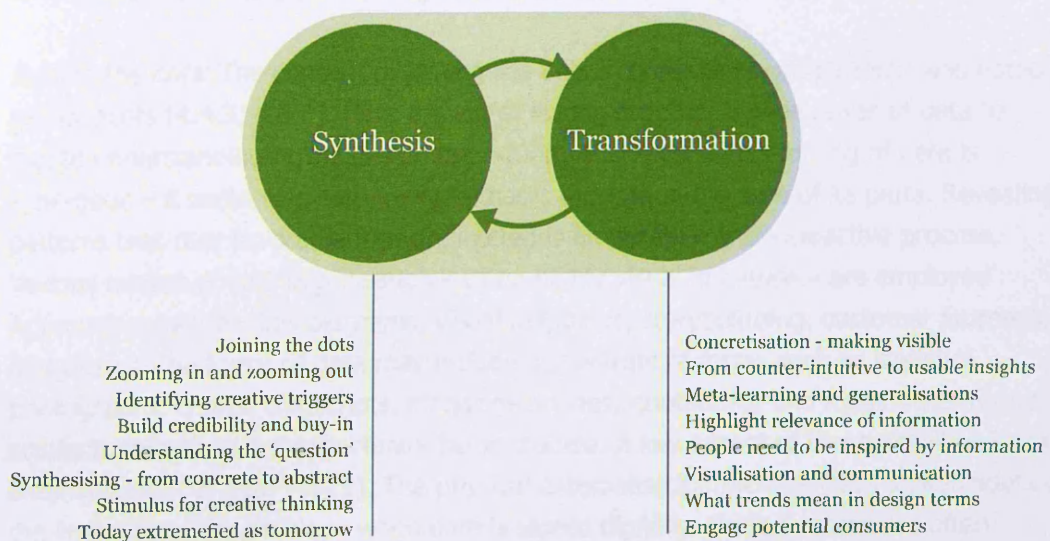


Fig. 5.3. Synthesis and transformation element of the framework

This element of the overall framework is constituted of two aspects:

- *Synthesis* where data is drawn together from a variety of sources in a number of forms, externalised, organised, framed, and synthesised into a usable information resource, and

- *Transformation* where data is moved from its raw state, reshaped, visualised, reorganised and consequently transformed into knowledge which is made available to the stakeholders in the development process.

The following sections will discuss these two aspects in detail.

5.3.1 Synthesis

The synthesis aspect of this framework element involved the organisation, manipulation, and structuring of data to support information building (4.1.4; 4.1.5; 4.2.1; 4.3.5; 4.4.3). These activities seek to create cohesion. This requires the use of judgement of stakeholders – individuals and/or teams – and results in a subjective process. It follows that an individual or team may synthesise the gathered data in a very different way. This is in line with Kolko (2007) who claims that during synthesis activities in design ‘the ability to replicate findings is not a relevant part of the design process’. A key pursuit of synthesis is that of understanding. Its ultimate intent is to enable knowledge acquisition from the available data. This is achieved in conjunction with the transformation aspect of this framework element. It does not seek to enable all stakeholders to access to all data; rather gain understanding of appropriate and pertinent insight. It may involve the synthesis of evidence and expert assumptions that creatively fuses disparate data in the form of insights, ideas, and assumptions into a new whole (4.1.4; 4.2.1; 4.4.3)

Joining the dots: The concept of joining the dots in order to reveal patterns was noted by respondents (4.4.3; 4.6.2). Here the act of linking together a wide range of data to create understanding of the design opportunity that exists. This joining of data is synergetic – it seeks to create a whole that is more than the sum of its parts. Revealing patterns that may be dormant or undirected is an iterative and interactive process. Various modes of data organisation – often highly visual in nature – are employed. Approaches include flow diagrams, visual mappings, storyboarding, customer journeys, and charts. The forms of data may include a spectrum of forms such as statistics, photographs, charts, transcripts, magazine articles, quotations, and many other forms of artefacts related to the opportunity being studied. A key aspect of these activities is the externalisation of data (4.4.5). The physical externalisation process frees stakeholders of the limitations of technology when data is stored digitally. Project rooms are often occupied for a period of weeks or months where all usable surfaces are covered in the above artefacts. Stakeholders inhabit these spaces in order to reveal underlying patterns in the data. This process is speculative and may require a creative leap where conclusive data is not available. Joining the dots involves the creation of an illusion of a fully coherent whole. As the name suggests, the dots create a clear image where pieces may be missing or unclear rather than a photorealistic representation (4.6.2).

Zooming in/zooming out: The synthesis process requires stakeholders to look at the big picture while seemingly simultaneously focussing upon particular details (4.1.6). This zooming in/zooming out process is not necessarily natural to designers. Respondents

noted that designers are intrigued by details and not necessarily predisposed to standing back and seeing the big picture (4.1.6; 4.6.2). Often tools are used (such as some of visualisation approaches noted above) to help to structure and support the movement between micro and macro issues. These tools help stakeholders to develop a mental model of the design opportunity. There is a progressive escape from the mass of data into insights (4.1.4; 4.3.1; 4.3.3). As insights begin to emerge, the usefulness of the mass of externalised data slowly diminishes. Zooming in and zooming out provides a level of validation within the identified pattern of the design opportunity. If a particular aspect of the pattern can be identified at both the micro and macro scale, it develops greater provenance and applicability. Such instances can help to build credibility for the insights identified through this synthesis activity as it reveals multiple instances of the design opportunity.

Building credibility: Credibility within the overall framework is challenging as there are no guarantees with regard to researching the future. Organisations look for a rigorous and replicable development process. As no absolute guarantees can be provided, multi-perspective research points of view help to assure stakeholders of the relevance and reliability of insights. Where possible, synthesis should include data from both a wide range of sources combined with a depth of expertise in specific context relevant to the overall project. This rigour aids buy-in of stakeholders and decision makers.

Understanding the question: Much of the focus of attention of synthesis activities are aimed at developing a clear and concise understanding of the question that design will be tasked with addressing. This is closely aligned with the concept of problem finding (or setting), rather than simply problem solving (4.3.5; 4.1.5). Problem solving is often associated with design and the design process. Problem finding is increasingly finding resonance with literature is design. Problem finding – or understanding the question – has long been a key aspect of design activity and in recent times, has received increasing attention from researchers (Lawson & Dorst, 2009; Brown, 2009; Koen et al, 2002; and Miller, 2002 for example). Within the context of this synthesis aspect of the framework, problem finding is concerned with uncovering patterns that reveal a path to (and ideally though) the design opportunity (4.3.4; 4.1.5; 4.3.5). By understanding the question, a clear route into the future can be developed. A level of uniformity may be applied to ensure the collective understanding of the apparent opportunity. This uniformity may apply to the communication of the design opportunity identified through problem finding activities as a concise set of insights. This approach is an effective and efficient use of resource.

Stimulus for creative thinking: Another aspect of the synthesis activity is to provide stimulus for creative thinking. By bringing together data from disparate sources, unexpected insights or synergies can be revealed (4.5.1; 4.4.3). Where such instances occur, they can inform and underpin creative thinking such as brainstorming or ideation, Creative thinking can help to bring together externalised data in such a way that it begins

to clean up the mess (Kolko, 2007) that the mass of data creates. Creative thinking applies visual design approaches to achieve this in the form of grids, charts, and maps, overlaying data sets for example (4.6.4; 4.5.5). Cleaning up the data by revealing key insights supports creative thinking in two ways: i) creative thinking is applied throughout this process to organise and structure data to reveal insights for the design opportunity, and ii) creative thinking is applied to insights drawn out from the data to reveal implicit and explicit relationships. Creative thinking approaches such as ideation may include the clustering of insights such that a form suitable for further exploration can be supported. In these activities, the aim is to reveal appropriate relationship rather than the right relationships (4.1.5). Subjective interpretation plays a part in this process.

Movement from concrete to abstract: Synthesis often includes the movement from concrete data gathered in the research process to abstract concepts (4.3.5). These abstract concepts may seem counter intuitive to the data collected but can be useful in breaking away from current expectations. Movement from concrete to abstract can initially seem unlikely to provide useful insights but respondents noted the need for a leap of faith in future oriented projects (4.1.4; 4.3.3). The process of abstraction, from concrete to abstract, both challenges norms and creates new and unexpected opportunity areas. It should be noted that not all of these opportunity areas will prove to be immediately fruitful within the development process but may result in identification of stepping stones into the future (Seymour, 2008). Once again a level of subjectivity is applied in the abstraction of data. Labelling of these abstract concepts is useful as it allows stakeholders to grasp such concepts, discuss them, debate their merits, and simply know they exist. Once their existence is apparent, then its credibility can then be explored.

Today extremefied as tomorrow: A final aspect of synthesis activities is the creation of a conceptual link between the data and potential futures (4.2.2; 4.2.5). This can be termed *today extremefied as tomorrow*. By synthesising data from today and exaggerating or extremefying it into tomorrow, a conceptual link between the present and the future is achieved. This approach is used in science fiction as a means of facilitating connections for the viewer or reader between existing states and proposed states. Respondents identified the need to enable this connection between the present and the future though the exaggeration of something that is understood today and transposing it into tomorrow (4.2.5). Techniques such as *Next Year's Newspaper Headlines* or *Minutes from the Board Meeting of the Future* serve as concrete examples of this approach.

Insights into the design opportunity are enabled by various data management activities that require stakeholders to assess and re-evaluate the appropriate data. The identification of patterns within the data – or joining the dots – provides signposts for subsequent creative activities. Consideration of micro and macro issues presents rigorous insights that help to build credibility within the development team and beyond. Problem finding is a key aspect of synthesis activities where clarity of design opportunities is

achieved through constant re-evaluation of data. Creative thinking can be applied to explore potential insights. By linking the present with the future through the use of *extremefication*, stakeholder buy-in is supported. Within this element of the framework, synthesis and transformation are inexorably linked.

5.3.2 Transformation

Transformation translates data and insights identified through synthesis and recasts them into a form that is useful within future oriented design projects (4.5.5; 4.6.4). This transformation involves the designer drawing upon their creative, intellectual, and visualisation skills (4.4.5; 4.2.6). It presents design opportunities such that an actionable roadmap can be created. Transformation within the framework results in the translation of abstract concepts into concrete instances of potential futures. In this it takes much of the output of the synthesis process and draws together, in a convergent way, the patterns, insights, questions and creative triggers into an actionable form (4.6.4). It prepares tangible and concrete snapshots of the future by translating counter intuitive abstract concepts into usable insights.

Concretisation: The transformation process is not clearly articulated by respondents. Specific aspects of this process were discussed but the exact manner and circumstances in which it occurs was not explicitly described. As noted, transformation involved the translation of the output of the synthesis activities into concrete insights. This involves making translation of abstract concepts into concrete ideas, or what some respondents termed concretisation (4.6.4). By making concepts specific and explicit through labelling or foregrounding them, tacitly held notions become explicit and tangible. This concretisation moves counter intuitive concepts through to concrete and usable ideas. These ideas form the landscape that the design opportunity will ultimately inhabit. A mix of creativity and systematic searching, combined with a blend of inspiration and diligent detection underpins the transformation process (4.1.4). It is not a completely reliable process that always results in success. By its very nature, exploring the future is replicable but not necessarily reliable. Transformation involves concretisation of a wide range of ideas, some that will prove to be fruitful, some will not. By employing such an approach, participants demonstrate due-diligence in the creation of visions of the future. They cannot guarantee the reliability of such a process.

Meta-learning: The transformation activity draws out and makes connections that form meta-learning – generalizable insights that cut across numerous aspects of a project (4.2.1). These meta-learning may represent a deep rooted attitudinal or behavioural trend that has long term potential provenance. Meta-learning provide future evidence of a potential truth that will provide credibility and confidence to a particular insight. Meta-learning (also termed meta-factors by respondents) may be drawn from research undertaken for the specific project under consideration but equally may draw upon broader research and identified consumer trends (4.2.1; 4.4.2) As such meta-learning may represent an organisations world view at a given point in time.

Highlighting the relevance of information: By making ideas explicit, supporting data may be utilised to ground proposals and provide credibility to claims (4.6.3). Highlighting the relevance of such information is undertaken to provide stakeholders and particularly decision makers with ammunition to undertake the decision making process (4.2.4; 4.2.2). As identified by respondents, organisations are often structured around the need for evidence to back-up key decisions (4.1.3). Although concrete and irrefutable evidence about the future is problematic, highlighting information that helps to build a case for a practical direction is seen as helpful.

People need to be inspired by insights: The manner in which insights are conveyed requires a persuasive approach (4.5.5). Insights need to inspire stakeholders (and ultimately future concepts) as creative techniques are used to persuade and energise. These include data rich visual design approaches that make tangible and engaging offerings (4.3.6; 4.6.4; 4.3.4). These approaches are context and project specific but are dominated by rich narratives that are visually engaging, creating future experiences that draw stakeholders in (4.4.1). Often a narrative hook is created that initially communicates the essence of the design opportunity. Once stakeholders connect with this idea, additional layers of information are woven into the insight to ensure a rich experience is conveyed. A variety of visualisation and communication approaches may be employed (see sec.5.4).

Engage potential consumers: Engagement with potential consumers may be undertaken during the transformation activity. Organisations often test the market for potential future products and services in advance of a planned launch (4.6.4; 4.4.5; 4.2.6). The automotive industry, through the concept car, has long adopted this approach and in doing so gauge customer reaction to particular future direction. This reaction can inform subsequent development activities and ultimately shape the actual product and service. Within this transformation activity, consumers may be engaged not to shape actual future products and services but to inform areas for further investigation in which the design opportunity will occur. This process is valuable in the prioritisation of areas for further consideration rather than informing final products and services. The engagement and responses of future consumers can result in different proposals than if they are not included (4.6.3). As Loewy (1951) maintained with his MAYA concept, it is about the Most Advanced *Yet Acceptable* proposal. Engagement with potential consumers can go some way to assessing the acceptability of a given future direction but should not be used as a stage-gate to veto ideas.

What trends mean in design terms: Transformation of data into usable insights requires translation such that relevance to design is supported (4.6.3; 4.1.5). The identification of a possible trend pattern is the first step in the synthesis and transformation process. Trend patterns are identified through the rigorous analysis evident within the synthesis activities, but these patterns must then be translated into a form that is relevant to design but appropriate to the specific project requirements (4.4.2; 4.6.3). Clarity is

needed to convey what these trend patterns mean in design terms. Visualisation techniques may need to be employed to make evident connections between identified trend patterns, which could be altitudinal, behavioural, or visual, and the design opportunity (4.5.5; 4.2.6). Restructuring, reorienting, and selective refinement may be needed to draw out the underlying essence of trend and to foster connection and relevance to the design opportunity. Grouping labels can be deployed to capture literal and implied meaning of the trend pattern. This makes obvious the relevance that has been created through the transformation.

In summary transformation involves insights relevant to the design opportunity being translated into a viable and relevant form. This process involves making counter intuitive or abstract concepts concrete and visible to the development team. In doing this, decision makers are able to apply judgement to their relevance and validity, Where possible, generalisations or rules of thumb are drawn from a broad data set in the form of meta-learnings. These meta-learnings provide credibility underpinned by deep rooted attitudes and beliefs that, in principle, are capable of transcending extended time horizons. The task that the development team has is to highlight and draw out the relevance of insights in such a way that they inspire stakeholders. In doing so, they convey what trend patterns mean in design terms, and ensure a connection between the research and creative activity is laid out.

5.3.3 Summary

The synthesis and transformation element of the overall framework are clearly linked. Synthesis of research data provides inputs into the transformation activity. Data from a variety of sources is aggregated into abstract or counter intuitive concepts that draw away from their point of origin. This divergent process provides material that can be translated into usable and relevant insights through the transformation process. Within the transformation process, convergence is applied to bring together rich trend patterns that can be used by decision makers to inform the choices related to the design opportunity. However, this overall process does not provide guaranteed success. The synthesis and transformation element of the framework illustrates the underlying process in design futures thinking that supports decision making. These activities do not necessarily provide concrete knowledge about how the future will be, but attempts to provide insight about how it could be.

5.4 Communication

The communication element of the framework involves three main factors: i) communicating the future, ii) prototyping and visualisation, and iii) self-fulfilling prophesy. These factors are interrelated and provide a platform for communicating future design opportunities in both abstract and concrete forms. The communication element of the framework is presented thus (see fig.5.4):

The aim of the communication element of the framework is twofold:

- a) To provide a vehicle by which stakeholders can understand and assess future oriented design opportunities, and
- b) To enable sensory engagement with future products and services such that feedback can be obtained.

There is much overlap in the methods and execution employed to achieve these aims.

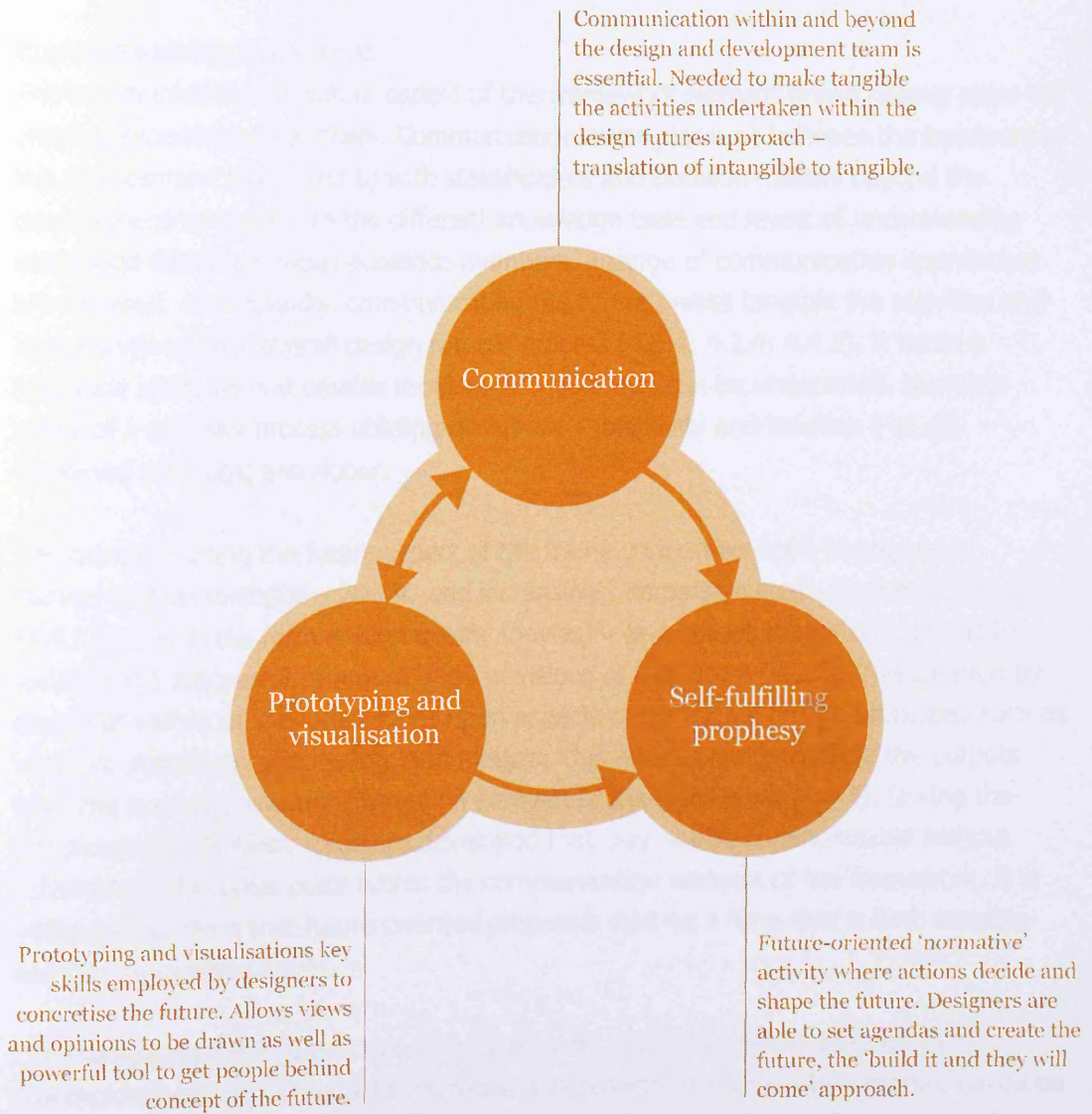


Fig. 5.4. Communication element of the framework

A key driver of the communication element of the framework is to prepare (and then evaluate) the market for potential future products and services (4.6.3; 4.6.4; 4.4.5; 4.2.6). Without communicating what future products and services may be, consumers do not know that they exist and thus cannot engage with them. Seymour (2010) describes

that as the *violence of the new* contending that 'it doesn't really matter how good a design is, if you don't prepare the receiver – the person receiving the idea – it will bounce off' (Seymour, 2010). This preparation of the receiver, or consumer, is likened to creating a runway for new ideas by Seymour, where momentum for new ideas is achieved. Without preparing the receiver, and creating the momentum, ideas for future products and services do not get off the ground.

The following section focuses upon communicating the future before moving on to prototyping and visualisation, and finally self-fulfilling prophesy.

5.4.1 Communicating the future

The communicating the future aspect of this framework element draws heavily upon the creative expertise of designers. Communication takes place: a) between the members of the development team, and b) with stakeholders and decision makers beyond the development team. Due to the different knowledge base and levels of understanding associated with the various audience members, a range of communication approaches are required. Conceptually, communicating the future makes tangible the activities and opportunities of the overall design futures process (4.6.4; 4.2.4; 4.4.2). It takes a multitude of inputs and creates tangible elements that can be understood. It makes sense of a complex process utilising designers' subjectivity and intuition (4.1.4), combined with logic and rigour.

The communicating the future aspect of the framework draws upon strong visual communication methods – 2D, 3D and increasingly immersive audiovisual experiences (4.4.1) (often in the form of high quality movies) – and utilises design based skills to facilitate the successful communication of visions of the future (4.2.6). The creation by design of visions of the future relies upon aspects of traditional design processes such as ideation, sketching, prototyping, and models. This aims to make tangible the outputs from the synthesis and transformation element of the framework (4.6.4). During the transformation process, ideas are developed that may not be communicable without refinement. This takes place within the communication element of the framework. It is within this element that future oriented proposals take on a form that is both tangible and communicable (4.6.4).

Communicating the future aims to create something that can be understood by stakeholders, such as potential customers, and provide feedback future market reactions to these proposals (4.6.3). This provided feedback that can inform refinement, and where necessary reconceptualisation by the development team, of the specific future proposals. Strategic decisions regarding the progression, refinement, or rejection of the project are often made upon the basis of this dialogue.

The value of communication in the decision making process is enabling dialogue between stakeholders in the organisation and market place with regard to the efficacy of future visions for products and services.

5.4.2 Prototyping and visualisation

Prototyping and visualisation are cornerstones of the design process. In many respects it is these skills that differentiate design from other disciplines. Designers use prototyping and visualisation to conceptualise and communicate the future in a variety of ways and at a range of levels. For example, designers may simply produce a quick sketch of a potential future product and use this to illicit stakeholder or consumer feedback. Alternatively a large amount of resource may be deployed to create a fully working concept car that represents the future vision for a whole automotive manufacturer. Whatever scale of engagement is conducted, prototyping and visualisation are used to develop, refine and communicate visions of the future (4.6.2; 4.2.6). These visions of the future provide organisations with mechanisms to develop an understanding of the potential viability of new products and services (4.6.3).

5.4.2.1 Prototyping: Prototyping is the process of developing physical (and increasingly virtually) manifestations of visions of the future for products and services. A prototype serves as typical example of the idea(s) under development. Prototypes come in many forms (visual or appearance prototype, proof of principle, proof of concept) and are created at various levels of sophistication and complexity (4.6.4). Within future oriented design activities prototyping is used to understand, explore, develop, refine, communicate, and validate potential visions of the future. Each of these attributes will be considered individually:

- *Understand:* Prototyping helps development teams to grasp intangible concepts and make sense of them within the development process.
- *Explore:* Prototyping provides mechanisms to investigate the potential scope and nature of potential visions of the future. Trying out many different possibilities in the early stages of the development process is much cheaper than costly mistakes in the latter stages of the development cycle.
- *Develop:* Prototyping can be undertaken incrementally enabling a number of avenues to be tested within a specific category.
- *Refine:* Prototyping provide designers with an effective means to iteratively make improvements to a potential product or service as each iteration can be judged and evaluated. Not all iterations result in improvements but do assist in the refinement process.
- *Communicate:* If a picture paints a thousand words, a physical prototype is a thousand words to a factor of ten. People relate to the material world in a rich and meaningful way. Prototypes also help to articulate physical issues such as scale, weight, proportion and texture.

- *Validate:* Prototypes help development teams to assess the validity of visions of the future and can be used to illicit market feedback from potential consumers. This feedback can then in turn be used within subsequent development activities. Prototyping and prototypes can be used to validate decision making within organisations as they provide proof of concept to new products and services.

Prototypes and prototyping play a number of key roles within design futures as it enables design to reach out to stakeholders and future consumers with tangible propositions of how they envisage the future to be (4.6.4; 4.5.5; 4.2.6). The creative abilities of designers are a key contributor within this activity. This approach enables design to convey discontinuous visions of the future that otherwise may not have been considered or developed. Once prototypes have been created they can inform both thinking about the future and test how people react to such thinking (4.6.3). The relationship between perceptions and reactions assist in the refinement of subsequent proposals. Ideas about the future are made concrete within prototypes and as such, these ideas are explored in the present. For a fleeting moment the future and the present co-exist.

5.4.2.2 Visualisation: Visualisation in design is a catch all term that has many variations and a multitude of manifestations. This thesis does not propose to explore the multiplicity of forms of visualisations; rather it seeks to relate visualisation to design futures. Visualisation - or simply the act of creating an image, diagram, or animation to enable communication - is an effective and efficient way to communicate abstract and concrete ideas (4.6.4; 4.5.5).

The use of visualisation in design to present information has long traditions. Within future oriented projects, visualisation has many parallels with traditional design approaches. Where it differs is that the subject matter being visualised does not yet exist. Visualisation is used to create an illusion, a means to create mental images of future states (4.2.6).

Visualisation approaches within future oriented projects provide the development team with an opportunity to present visions of the future in a way that breaks existing norms and expectations. Experiential visualisation techniques such as multimedia interactives or narrative movie draw upon advances in digital technologies (4.3.4; 4.2.6). These technologies can augment more traditional visualisation techniques such as sketches, drawings, storyboards, charts, and montages to enable experiential engagement with future products and services. Extended time horizons can allow a looser attachment to current day realities and provide an outlet for creative imagining (4.2.5). By stretching the links with current day norms and expectations, there is a danger that stakeholders may be alienated due to the newness of the proposals (4.4.3; 4.2.3). Caution is needed to visualise the future in such a way that it draws people in rather than pushing them away. Designers use visual clues from the past and the present, transposing them into the future as a means of addressing this issue (4.1.1; 4.1.3).

As with prototypes, visualisations are used to illicit feedback from stakeholders and potential consumers. This feedback loop is a valuable aspect of the use of visualisation in future oriented design activities. It places design in central role in this feedback loop as, without such visualisations, feedback is much harder to achieve. Without tangible visualisations, visions of the future are open to much wider (mis)interpretation (4.2.6). Visualisation provides organisations with more precise control over how they communicate their visions of the future. In this sense, visualisation is central and an essential aspect of the communication element of the framework (4.6.4).

By creating tangible visions of the future, visualisations lay a path from the present into the future, enabling stakeholders and future consumers to understand how the future may be (4.6.3; 4.1.5). Through this understanding, feedback can be provided with regard to their perceptions to the value of proposals. Creativity can be employed to visualise products and services that do not exist. This allows a high level of creative latitude but must be conducted with caution. The designer must be mindful not to alienate stakeholders and future consumers. They are charged with developing visions of the future that viewers can connect with. Without this connection – on a practical and emotional level – the visions of the future remain just that. A vision of the future that may never exist.

The combination of prototyping and visualisation provides organisations with a powerful means by which they can get people behind a particular vision of the future. As Seymour (2010) noted, the violence of the new requires careful handling of the path into the future. Designers must be aware that they need to create visions of the future that people can get behind and believe in (4.6.3). Visions of the future that stakeholders connect with should be an ultimate aim. In doing so, design can enable momentum to be developed in support of the visions of the future (4.1.5; 4.6.1).

5.4.3 Self-fulfilling prophesy

When fashion houses predict that a particular colour or fashion garment will be big in the coming seasons, they create a self-fulfilling prophesy. By communicating their particular vision of the future, a chain of events are initiated. This chain of events includes fashion journalists, fashion buyers, fashion retailers, and ultimately the end consumer. Consumers purchase the said colour or garment which by this point is *on-trend*. If the fashion house did not initiate this chain of events by predicting the next seasons fashion must have, this circumstance would have never happened. No self-fulfilling prophesy.

Within future oriented design projects there are two main aspects of the self-fulfilling prophesy: i) designers take an intrinsic interest in the future and create visions of the future that enable creative exploration of future states, and ii) visions of the future are supported by organisations and subsequently put into production (4.1.2; 4.5.2). These two self-fulfilling prophesy aspects are inexorably linked and may be considered different points upon a continuum. Without i), ii) would not exist.

Deciding to explore and conceptualise the future, organisations adopt a future oriented normative stance. They will develop a point of view upon what they feel the future should be. In doing so they actually shape the future they want through their actions. Design plays a key role by enabling and creating visions of the future that in time become the present. Some of these visions that design creates make it over the various hurdles in their way such that these visions of the future of products and services become available to consumers (4.1.2).

Within this framework element, the self-fulfilling prophesy concept has much in common with the futures thinking foresight approach. Foresight – the human capacity to think ahead and make decisions that shape the future – aligns with the self-fulfilling prophesy. The underlying driver here is to, as Dahle (1996) claims, contribute to desirable changes. By putting forward visions of the future, organisations set agendas that create the future. This is essentially the *build it and they will come* approach.

It is clear that the self-fulfilling prophesy relies upon actions in the present having a desirable impact in the future (4.1.2) There is no guarantee that this will be the case. When organisations develop new products or services many of them are not successful and as such do not become a self-fulfilling prophesy. The creation of a future product or service does not result in a self-fulfilling prophesy, these products or services need to be adopted and utilised in the market place. A self-fulfilling prophesy cannot be created by a designer in an organisation alone. There needs to be a meaningful engagement beyond the launch of a new product or service (4.6.4; 4.5.2). It is the consumption and adoption that closes the loop in a self-fulfilling prophesy. Design plays its part but a wider perspective is essential if the prophesy is to become a future reality.

In summary organisations can, by the very will of their actions, shape the future by developing new visions for products and services (4.1.2; 4.5.5). By actively creating future products and services they populate the future market place such that their visions become our future. Even though organisations proactively attempt to shape our future, this is no guarantee of a successful self-fulfilling prophesy. Without the engagement of consumers, potential visions of the future do not necessarily become our future. There is a complex relationship between creating a vision of the future and it actually being adopted in the future (4.6.2; 4.6.3).

5.4.4 Summary

The communication element of the framework is primarily concerned with the communication of visions of the future resultant from the design futures process. It draws upon aspects of the three elements previously detailed, namely: i) contextual factors, ii) design futures research process, and iii) synthesis and transformation and communicates them to the development team, broader stakeholders, and future consumers. It is not possible to trace explicitly the activities and outputs within these three framework elements and identify how they have informed the communication

activity. The communication element of the framework is a multi-faceted, multi-layered, multi-dimensional, multi-modal set of interrelated activities. It draws upon designerly approaches, such as iterative and interactive activities, and aims to create and convey engaging visions of the future. This is a two way process where responses to visions of the future feed back into the communication activity. By communicating visions of the future, designers are implicit within the initiation of a self-fulfilling prophesy – visions that become the future. This activity is highly creative and provides a platform for imaginative interpretations of our future. Inherent within this is design's ability to create desirable visions of the future where envisaged products and services are dominant forces. Organisations employ the persuasive ability of designers to visualise and communicate a future that is yet to come, use these visualisations to illicit feedback, and prepare a path into this future.

This section has considered the overall role of communication element within the framework. The final section of this chapter deals with the relationship of the four framework elements to each other and their position and role within the overall design futures framework.

5.5 Design Futures Framework

This section presents an overall design futures framework. It explores the relationship of the six research propositions to the four framework elements (previously discussed in sec.5.1-5.4 of this chapter). The six research propositions are mapped against the four framework elements which aimed to make clear the relationship between the research propositions (and thus theoretical categories and substantive factors) and the framework elements.

The six research propositions are:

- RP01 Designers consider the future as an intrinsic aspect of the design process (sec.4.1)
- RP02 Designers use futures thinking approaches within the design process (sec.4.2)
- RP03 There are no commonly accepted approaches in futures thinking in the design discipline (sec.4.3)
- RP04 Designers appropriate futures thinking methods and techniques from other areas and augment them to support design activity (sec.4.4)
- RP05 External agencies provide future based knowledge for designing (sec.4.5)
- RP06 Futures thinking approaches are increasingly being employed in design (sec.4.6)

The four framework elements are:

- 1) Contextual factors (sec.5.1)
- 2) Design futures research process (sec.5.2)
- 3) Synthesis and transformation (sec.5.3)
- 4) Communication (sec.5.4)

As outlined in sec.5.0, the development of the design futures framework involved iterative mapping and visualisation of substantive factors (see fig.3.1.2 for an example of the visualisations). A range of tactics were employed to generate meaning out of the data (see sec.3.3.4 for an overview of such tactics (as outlined by Miles & Hubberman, 1994)). These included noting patterns and themes, clustering, making contrasts and comparisons, factoring, submitting particulars to the general, and building a logical chain of evidence for example. This process resulted in four initial framework elements (see appendix A.3) which were subsequently tested and confirmed with industry experts through a series of interviews (see fig.3.13 for interviewee details). A variation of *member checking* (Creswell & Miller, 2003) was utilised to assess the validity of the proposed findings by asking respondents whether these initial framework elements were an accurate reflection of their experiences (Creswell & Clark, 2007). Responses from these experts informed a revised set of framework elements as detailed in sec.5.1-5.4. Once the four final framework elements were confirmed the four framework elements were mapped and cross-referenced against the research propositions and associated theoretical categories. The mapping activity enabled a reassessment of research findings which aimed to provide an understanding of the role of futures thinking in design.

The research propositions are presented with their associated theoretical categories. Substantive factors are not identified within the design futures framework as individual elements as this would duplicate the work presented in the research findings (chapter 4). Through the five stage design futures framework development process (as discussed in section 5.0), the substantive factors have been synthesised into the four framework elements. The weaving together of research propositions, substantive factors, theoretical categories, and framework elements culminated in the development of the design futures framework. The design futures framework (fig.5.5) aims to convey the role of futures thinking in design.

The manner in which the six research propositions are manifested within the framework differs, and thus how in turn they were mapped against the four framework elements. Four of the six research propositions (RP01, RP02, RP04, and RP06) and associated theoretical categories were mapped directly against the framework elements. This enabled the associated theoretical categories for these four research propositions to be cross-referenced in detail against the four framework elements. By exploring the theoretical categories and not just the research propositions it was possible to represent a detailed relationship between constituent elements of the overall framework. The four research propositions that were mapped against the four framework elements were:

- RP01 Designers consider the future as an intrinsic aspect of the design process
- RP02 Designers use futures thinking approaches explicitly within the design process
- RP04 Designers appropriate futures thinking methods and techniques from other areas and augment them to support design activity
- RP05 External agencies provide future based knowledge for designing

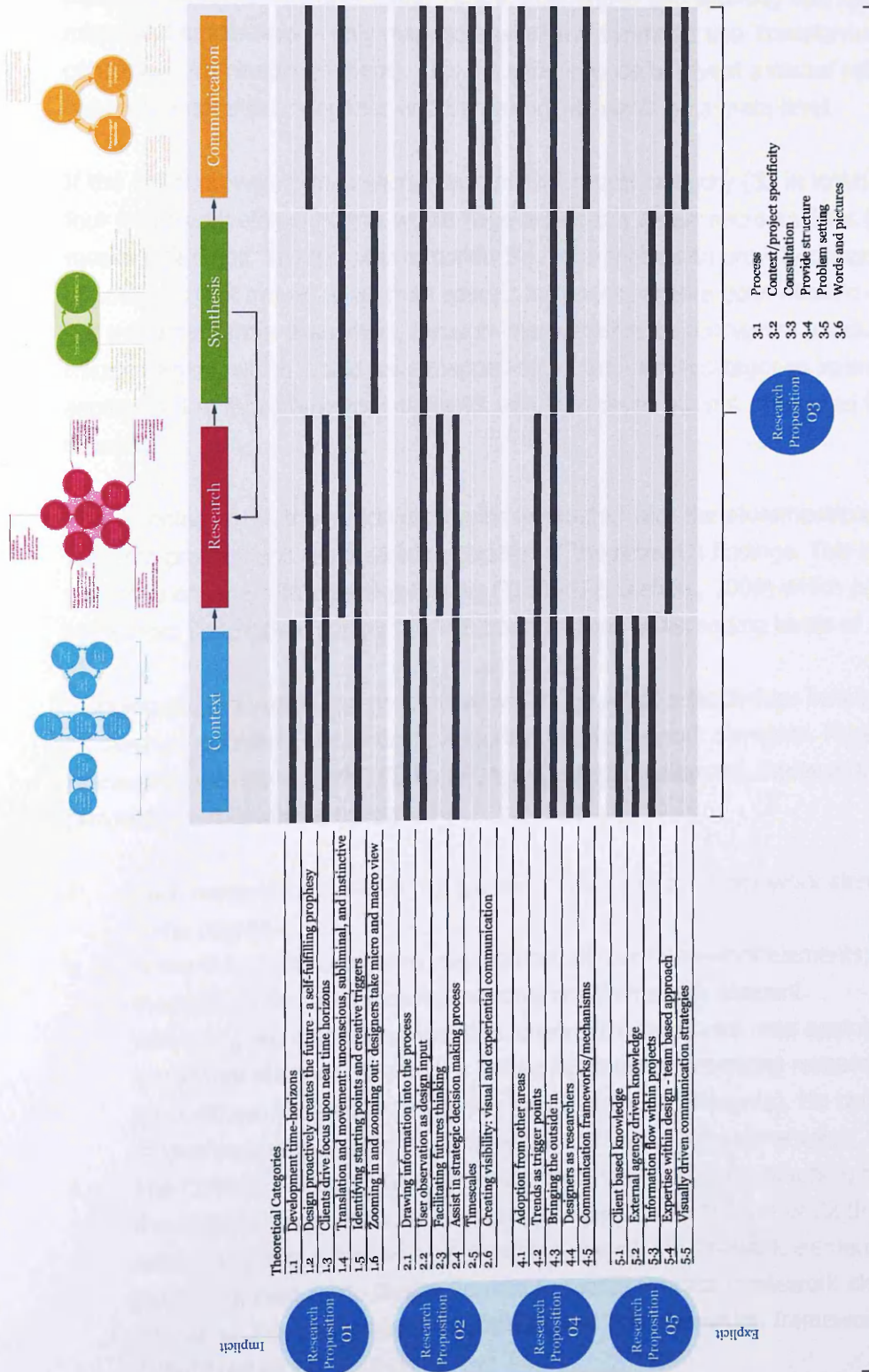


Fig. 5.5. Design futures framework

The theoretical categories (TC) associated with the above four research propositions (RP01, RP02, RP04, and RP06) can be mapped against all four framework elements (e.g. TC.2.2: User observation as design input) while others can be mapped onto only one of the four framework elements (e.g. TC.1.6: Zooming in and zooming out: designers take micro and macro view is only mapped against the Synthesis and Transformation conceptual framework element). This mapping intends to reveal a causal relationship between theoretical categories and framework elements on a meta level.

If the intention was to map each individual theoretical category (33 in total) against the four framework elements, this would have provided a dense micro analysis of the research findings. The aim was to conduct a meta-analysis to provide conceptual conclusions that moved away from specific instances to more generalizable observations – a movement from descriptive, through interpretative, to conceptual conclusions. A micro analysis, which would have mapped all 33 theoretical categories against individual aspects of the four framework elements was considered but not conducted for the above reasons.

The mapping of the theoretical categories associated with the aforementioned four research propositions required interpretation of the research findings. This enabled the author to engage with *meaning-making* (Trafford & Leshem, 2008) which provided a route from descriptive factors, through interpretation to ascending levels of abstraction.

Mapping the theoretical categories revealed a rich set of relationships between the research propositions, theoretical categories, and framework elements. Mapping the four research propositions (RP01, RP02, RP04, and RP06) against the framework elements provided the following insights:

- Each research proposition maps against all four of the framework elements to some degree.
- Some theoretical categories map against all four framework elements; some theoretical categories map against only one framework element.
- Within a given research proposition, theoretical categories map against the framework elements to create a unique relationship (involving research propositions, theoretical categories, and framework elements). No two research propositions map against the framework elements in the same way.
- The Contextual Factors framework element has the highest mapping relationship of theoretical categories to framework elements at 68% (15 out of 22 theoretical categories); this is followed by the Communication framework element: 50% (11 out of 22); next is the Design Futures Research Process framework element: 45% (10 out of 22); and finally the Synthesis and Transformation framework element: 32% (7 out of 22).
- Mapping all the theoretical categories against the framework element resulted in 49% (43 out of 88 theoretical categories).

The theoretical categories of two research propositions (RP03 and RP06) were not mapped individually against the framework elements; rather they were mapped against group aspects of the framework. The nature of these two research propositions and their role within the overall framework will be considered individually.

First we will consider RP03: There are no commonly defined approaches in futures thinking in the design discipline:

- RP03 is concerned with the lack of commonly accepted approaches to futures thinking in design. As demonstrated in the findings and analysis of the individual framework elements, a generic understanding commonly accepted approaches to futures thinking in design is possible. Due to project and context specificity, extending this understanding to specific instances is problematic.
- Six theoretical categories were derived within the research findings for this research proposition (see chapter 04, sec.4.3) and represent a range of concerns, for example TC.3.2 - Context/project specificity which results in the need for bespoke approaches, and TC.3.5 - Problem setting which relates to the fuzzy front end of future oriented development projects. These theoretical categories are applicable across all framework elements.
- The development of the four framework elements aims to reveal a generic design futures framework and as such identifies commonly accepted approaches to the use of futures thinking in design. In doing so it establishes a clear link between the four framework elements and RP03.

Now we will consider RP06: Futures thinking approaches are increasingly being employed in design:

- RP06 is concerned with the increasing use of futures thinking in design. This research has sought to demonstrate the overall role of futures thinking in design and points to an increase in both frequency and level of its use in design.
- Empirical evidence identified in the research findings (chapter 04) which was subsequently analysed and abstracted by the development of the framework elements (chapter 05) was brought together to confirm RP06 – a demonstrable increase in the use of futures thinking in design.
- RP06 was mapped against the four framework elements, five research propositions (RP01-05), and resultant matrix. RP06 reveals a key finding from this study, namely that futures thinking approaches are increasingly being used in design.
- The mapping of RP06 results in it encompassing all other research propositions (RP01-05), theoretical categories (TC.1.1-5.5), and the four framework elements. Through this mapping, a relationship between the research propositions and framework elements such that the nature of the increasing role of futures thinking in design can be communicated explicitly.

The relationship of RP03 and RP06 to the other aspects of the framework demonstrate a conceptual or abstract link between futures thinking and design. Although specific and detailed instances of the link between futures thinking and design have been presented within this thesis, the design futures framework aims to reveal these relationships upon a meta level.

5.5.1 Summary

The design futures framework aims to reveal a representative picture of the role of futures thinking in design. It was developed in an iterative manner and through a process of consultation and refinement, a final design futures framework was developed. This represents a synthesis of data from literature, and empirical findings in the form of research propositions, theoretical categories, and substantive factors. The engagement with industry experts, through a form of member checking (Creswell & Miller, 2003), resulted in revisions to the conceptual framework elements (the initial four framework elements are presented in appendix A.3).

The design futures framework aims to articulate the explicit relationship of all of its constituent elements culminating in a representative picture of the role of futures thinking in design. Through the mapping activity it became apparent that there was a complex and interconnected relationship between the research propositions and the framework elements. The mapping activity of the theoretical categories underpinned the development of the understanding of these multi-layered relationships.

This chapter has discussed the development of the design futures framework. It has detailed the overall development process, outlining the stages within its development and the creation of the framework elements. The final section of this chapter has dealt with bringing together of these four framework elements into an overall design futures framework. In doing so, a movement from the specific to the abstract has been undertaken. Increasing levels of abstraction have been applied to make-meaning out of the research data.

The following chapter will provide conclusions to the body of research contained within this thesis. It aims to distil the research findings such that conclusions may be drawn. It will attempt to reconcile the arguments and ideas presented to provide a suitable text to close the thesis. The following chapter will also identify potential limitations resulting from the adopted research approach, outlining the validity and reliability of the presented research. It will also aim to remind the reader of the original motivation for this research, challenges encountered on the way, and how these challenges were addressed. It will conclude with an agenda for further research that has emerged from this investigation.

06

Conclusions, Limitations, and Further Research

6.0 Introduction

This chapter aims to provide conclusions to the body of research contained within this thesis. It intends to discuss the research contribution to knowledge and interpretations of the findings, the limitations of the adopted research design, and to present an agenda for further research.

First, it presents an overview of the research aim and findings (section 6.1) is followed by the claim of contribution to knowledge (section 6.2). Second, it discusses potential limitations resulting from the adopted research approach, outlining the validity and reliability of the presented research (section 6.3). Third, it presents an agenda for further research that has emerged from this investigation (section 6.4). The chapter ends with concluding remarks regarding the body of research contained within this thesis (section 6.5).

6.1 Overview of the research aim and findings

To recap the beginning of this thesis, the central purpose of this research was to investigate the role of futures thinking in design.

6.1.1 Research motivation

The motivation for this research derived from three main areas: i) as a trained product designer, the author has engaged with future oriented design projects for over a decade, and as such wanted to develop an empirically based understanding of this area; ii) the limited academic research in the area of design led futures means that there is a limited theoretical base, particularly in the design field, related to the focus of this research; and iii) the desire to develop an understanding of the manner in which designers consider the future such that this can be subsequently used to inform design

activity. These motivations are set against a backdrop of increasing demands placed upon design and designers to respond to societal challenges of the 21st century. This research has identified that the demand for future focussed design methods, particularly in contemporary design practice, is growing. The challenges design faces include opportunities and cognition demands provided by digital technologies and digitally enabled products, the increasing adoption of a product service system approach, the increasing globalisation of products and brands, the democratisation of design, and the challenge of providing sustainable futures for example. In short, the world is demanding more of design, asking it to develop products and services that are not only required but desired by future consumers with time horizons it is being asked to consider extending.

6.1.2 Research approach

The initial starting position for this research was three research questions, namely:

- RQ01: How do designers engage with the future within the design process?
- RQ02: What futures thinking methods are employed in the design process?
- RQ03: What futures thinking methods do designers employ?

The above research questions were formalised from a tacit understanding of the future oriented design process obtained as a designer. The development of these questions occurred before the literature review was conducted for this thesis but was based upon published work undertaken by the author in the field. As such, these questions were based upon and understanding of design practice (gained from being a designer) and through academic research (gained from researching and publishing in the field).

A review of the literature (chapter 02) resulted with an understanding of the *state-of-the-art* with regard to the interface of futures thinking and design. This enables the development of six research propositions (chapter 02) that informed and underpinned the empirical research activities of this study. It was proposed that by exploring these research propositions this would generically answer the three research questions (chapter 03). The research propositions were used to generate questions for a series of semi-structured interviews which were conducted with experts in the field. A rigorous analysis of the research data resulted in the research findings that generated a series of theoretical categories and substantive factors (chapter 04). These theoretical categories and substantive factors were organised utilising the six research propositions as an underlying structure to the research findings. The research findings were reassessed to formulate elements of a design futures framework through abstraction and synthesis of the research findings (substantive factors) and research propositions (chapter 05). These elements were developed, tested and validated by interviews with experts via member checking. Using all data, the author redesigned a framework that provides a representative picture that conveys how designers use futures thinking in design (5.5).

The research propositions were developed to enable the interrogation of the research questions and provide a structure to data collection and analysis. The research propositions were mapped against the research questions thus (see fig.6.1):

	RQ1: How do designers engage with the future within the design process?	RQ2: What futures thinking methods are employed in the design process?	RQ3: What futures thinking methods do designers employ?
RP01: Designers consider the future as an intrinsic aspect of the design process	x		x
RP02: Designers use futures thinking approaches within the design process	x	x	x
RP03: There are no commonly accepted approaches in futures thinking in the design discipline		x	x
RP04: Designers appropriate futures thinking methods and techniques from other areas and augment them to support design activity			x
RP05: External agencies provide future based knowledge for designing	x		
RP06: Futures thinking approaches are increasingly being employed in design			x

Fig. 6.1 Mapping of research questions against research propositions

6.1.3 Research Findings – Research Propositions

This section will individually discuss to what degree the research questions have, or have not, been answered. The use of research propositions to enable the interrogation of the research questions resulted in the findings represented in chapter 4, which subsequently enabled the development of the design futures framework (chapter 5). The research propositions were mapped against the research questions as denoted in fig.6.1. Prior to considering to what degree the research questions have, or haven't, been answered; it is relevant to discuss the findings in relation to the research propositions. Each research proposition will now be considered briefly:

RP01 Designers consider the future as an intrinsic aspect of the design process

Findings from this study confirm fully that designers consider the future as an intrinsic aspect of the design process. The manner in which they do this is varied and is undertaken both tacitly and explicitly. Designers operate in a space between the world that is and the world that could be. Designers proactively create the future and through their actions (4.1.2; 5.4.3) and trigger a self fulfilling prophesy. The future they imagine becomes the future we occupy. By being able to deal with macro and micro issues (4.1.6) they absorb and transform social, cultural, technological and business early warning signs into tangible entities (5.3.1) through synthetic and creative application of the design futures design process.

Instinct and intuition are a key factor in the way designers consider the future (4.1.4; 5.2.4) undertaking exploration and communication of future products and services in a seemingly subliminal manner. Due to the time it takes to develop and launch new products and services, designers must be thinking a number of years ahead as the launch date is already in the future (4.1.1). By considering the launch time horizons of future products and services, they are unconsciously or tacitly considering the future within the design process. Although on the surface clients commission future created projects, in reality these projects may actually be more related to the current context (4.1.3). Designers face a challenge to make clients think longer term and allow designers to apply their creativity to longer time horizons (4.1.5).

In summary, the research findings have supported the research proposition, namely designers consider the future as an intrinsic aspect of the design process.

RP02 Designers use futures thinking approaches within the design process

The use of futures thinking approaches by designers are evident within the research findings. Numerous futures approaches were identified through the data analysis including scenarios, storyboarding, trend forecasting, trend mapping, and backcasting for example. Designers draw research information into the design and development process (4.2.1) from a multitude of sources, in a variety of ways (5.3), and transform and synthesise this data into insights that reveal the design opportunity (5.3.1; 5.3.2). The use of futures thinking is often integrated with more traditional designerly approaches and where successful, becomes integrated into an overall future oriented development process (4.2.3; 5.2.3; 5.2.5 for example). A key factor in designers' engagement with futures thinking is the possibilities that such an approach offers for strategy development. By engaging with strategic business planning through the appreciation of futures thinking approaches within, and through design (5.1.1, 4.2.4), design is moving upstream within the organisation (5.1.1). As noted in RP01, designers consider the future as an intrinsic part of the design process, so it follows that they (often unknowingly) apply future thinking within the design process. As demonstrated in figure 2.31, there are many similarities between futures thinking and design activities even though the terminology differs.

The design futures research process (5.2) deconstructs the research activities undertaken within future oriented design projects and identifies a number of futures thinking approaches undertaken by designers. These include narratives and scenarios (5.2.3), trend mapping (5.2.2), expert opinion and Delphi oracles (5.2.5), and environmental scanning (5.2.1) for example. It should also be noted that designers may not be formally trained in such techniques and may lack understanding in the theoretical underpinnings of futures thinking.

In summary, the research findings provided clear evidence that designers use futures thinking approaches within the design process.

RP03 There are no commonly accepted approaches in futures thinking in the design discipline

This proposition asserts that there are no common accepted approaches in futures thinking in the design discipline. The research findings revealed a range of futures thinking approaches that are employed within design. The level of project and context specifically (4.3.2) requires tailored processes but this doesn't mean that these aren't commonly accepted approaches (4.3.1). The use of prototyping and visualisation (5.4; 4.3.6) as a communication tool, the application of creative human centred techniques to uncover people's unmet needs (5.2, 4.3.3) in response to myopic and unreliable consumers (5.2.1; 4.3.3), and video based prototyping which creates figments of truth (4.3.4) that addresses Seymour's *violence of the new* concerns (Seymour, 2010) are all utilised in design. The research was identified the use of common futures thinking approaches that provide structure to future oriented design projects (4.3.4) and in turn lead to problem finding or setting (4.3.5, 5.3.1). This requires the synthesis and transformation of the research data collected and generated within the development process. By structuring this information it can be used in a meaningful way by, and for, design.

Through the development of the elements of the framework, theoretical categories, and substantive factors, we have used empirical evidence to illustrate a general framework in which commonly identified futures thinking approaches are evident.

In summary, the research findings do not fully support the research proposition that there are no commonly accepted approaches in futures thinking in the design discipline. This research has contributed to identifying and revealing commonly accepted futures thinking approaches in design. One of the motivating factors of undertaking this research was the limited availability of academic research in the field, and as such this lack of knowledge influenced this research proposition. The research findings have resulted in a design futures framework that reveals a clearer picture of the way in which designers considers the future and the role of futures thinking in design.

RP04 Designers appropriate futures thinking methods and techniques from other areas and augment them to support design activity

This research proposition contends that designers augment futures thinking approaches to support design activity. There is a tradition of designers adopting and adapting tools and techniques from outside design to their own ends. Futures thinking is no exception (4.4.1; 5.2.3). The application of trend monitoring is now relatively common place within contemporary design practice (4.4.2; 5.2.2) although the level at which it operates and is executed varies greatly. One of the key motivations of the application of futures thinking methods and techniques in design is to bring outside viewpoints into the design and development team (4.4.3; 5.2.5; 5.2.3; 5.1.3). Approaches include immersion tours and analogous visits, expert panels, focus and un-focus groups, ethnographic observation,

camera journeys, and interviews. The use of expert opinion can act as validation in future oriented projects, and is partially for valued by clients (5.2.5).

Increasingly designers are broadening the range of research activities that they engage in (4.4.4) and continue to develop synergies within and beyond design. The output of such design activities can often inform other strategy and project definition (2.9). These approaches support design in the reconceptualisation and re-contextualisation (Krippendorff, 2006) what was previously assumed fixed. This can demonstrate that limits are malleable, questioning what has gone before to identify available paths to desirable futures. The manner in which designers augment futures thinking methods and techniques is often in response to project, client and resource demands and continues to develop.

In summary, the research findings supports the research proposition that designers appropriate futures thinking methods and techniques from other areas and augment them to support design activity. What is less clear is the exact manner in which designers select, augment, and apply futures thinking methods and techniques in design. Sector, project and client parameters are contributory factors.

RP05 External agencies provide future based knowledge for designing.

There is clear evidence within the research findings that external agencies are providing future based knowledge for designing. The opportunities offered by developments in design technologies (4.3.3) has enabled increased information flow between stakeholders. This flow of information involves data from many sources, collected for number reasons, created for a variety of purposes (4.5.1; 4.5.3; 5.3.1; 5.3.2). Agencies external to the design and development team provide future based knowledge for designers ranging from the general to highly specialised (4.5.1). It can be qualitative and/or quantitative and have been commissioned for a specific project or generally available information (such as demographic changes). Large organisations may have internal departments that collect and provide this information; equally these organisations may use external agencies to provide another point of view upon pertinent issues to their operations.

The use of external agencies may be beneficial when an organisation's culture does not support future oriented projects (4.1.2). This approach may remove barriers to innovation that would otherwise prevent project progression and success. A concern for the use of external agencies is that of lack of development of tacit understanding of the area under consideration and ownership of the information generated (4.2.2). Often organisations who successfully engage external agencies develop close working relationships, even co-locating for periods of projects (4.5.4). This can help to subsequently develop internal competencies in futures thinking research.

With increasing specialisation and segmentation in the development landscape, partly in response to technological development and societal change, organisations need to draw upon the capabilities of external agencies to fill knowledge gaps (4.4.2). Designers are still well placed to utilise this information and translate it into a tangible form for use by the development team (4.5.5).

In summary, the research findings support the research proposition that, in some instances, external agencies provide future based knowledge for designing. There are indications of the use of external agencies such that their capabilities are becoming more embedded within design and development.

RP06 Futures thinking approaches are increasingly being employed in design

One of the initial premises that underpinned undertaking this research was this research proposition, namely that that futures thinking approaches are increasingly being employed in design. The research findings strongly support this proposition and through conducting this research, empirical evidence has been generated to substantiate this position (4.6.1; 5.6.1) within an increasingly complex development landscape (4.6.1), combined with increasingly savvy clients and consumers, design is increasingly required to conceptualise, synthesise and make tangible, desirable, feasible and viable futures (5.1.3).

More and more organisations are utilising design to enable strategic opportunities to be identified (4.6.1; 5.1.1), applying a combination of anticipatory thinking and creative engagements, design is able not only to conceptualise potential futures, it is able to make them tangible (4.6.4; 5.4.2). This concretisation utilises a wide range of designerly skills, broadly under the guises of prototyping and visualisations and through creative thinking, provide visions of the future in the present (5.4.1; 5.4.2).

The alignment of futures thinking research approaches with designers' intent (4.6.3) has been revealed through this research. The applicability of futures thinking research activities to design opportunities undertaken by specialist agencies and/or designers is a fitting response to the need to not only understand increasingly complex consumer behaviour but to capitalise upon it to support organisations goals (4.6.2; 4.6.3; 5.1.1). Through the alignment of futures thinking and design activities organisations can create momentum behind future oriented activities (4.6.4), develop an innovative image for the organisations (2.6.2), test market responses to future products and services (4.6.4, 5.1.1, 5.2.3), and navigate increasingly complex and competitive landscapes (4.6.2).

In summary, the research findings strongly support this research proposition, namely that futures thinking approaches are increasingly being employed in design. The findings of the research, in particular the framework elements (5.1, 5.2, 5.3, 5.4) and overall design futures framework (5.5) helps to reveal the manner in which these approaches are being

employed in design, by who, and the contribution to strategy these activities are supporting.

6.1.3.1 Discussion

Thus far this section has explained to what extent the research propositions have, or have not, been supported by the research findings. It is clear from these findings that the majority of research propositions have been supported. The research has not generally supported RP03, namely that *there are no commonly accepted approaches in futures thinking in the design discipline*, in that through the development of the framework based upon research findings the author has been able to illustrate common approaches.

The design futures framework provides a conceptualisation of generic approaches to futures thinking in design and through its creation has provided evidence of broadly adopted working practices. As noted in the literature review, commercial sensitivities mean that design organisations reveal *what* future oriented services they can offer clients, but not *how* they would conduct these activities. The design futures framework articulates the role of futures thinking in design and communicates the relationship(s) of all its constituent elements. The nature of the increasing role of futures thinking in design is made explicit.

The next section will discuss to what degree the research questions have or have not been answered.

6.1.4 Research findings – Research Questions

Three research questions underpinned the research contained within this thesis, namely:

- RQ01: How do designers engage with the future within the design process?
- RQ02: What futures thinking methods are employed in the design process?
- RQ03: What futures thinking methods do designers employ?

As noted in chapter 3, it was maintained that by exploring the six research propositions, this would generically answer the three research questions. Research findings in respect of each research question will now be considered individually. The first research question is *how do designers engage with the future within the design process?*

RQ01: How do designers engage with the future within the design process?

Research findings clearly demonstrate that designers engage with the future in the design process. This engagement is on multiple levels, in numerate ways, and across all stages of the design process.

The development of the design futures framework reveals a picture of the manner in which designers engage with the future. This approach aims to explicitly communicate the role of futures thinking in design. Designers engage with the future in implicit and

explicit ways, and are able to articulate this engagement through design. Engagement with the future within the design process is exemplified by:

- Design is a future oriented activity (Margolin, 2007; Krippendorff, 2006; Seymour, 2008) in which designers occupy the space between the world that is and the space that could be. Their actions shape the future, and as such they engage with the future by actively creating it.
- Designers uncover unmet consumer needs, wants and desires and use these insights to inform future oriented design activity. The ultimate goal of this approach is to identify information that can help designers to create future products and services that are not only required in the future, but are desired.
- Through a complex and iterative process of synthesis and transformation of research data, designers engage with the future through revealing future design opportunities. These opportunities are identified through the movement from data to information, and information to insight utilising visual mapping techniques. This movement involves various levels of abstraction before drawing together into actionable insights.
- Designers engage with the future in the design process through the creation of visions of the future. These visions of the future demonstrate what may be possible in the future and, in many cases, differs from our world today. The aim of this intellectual repositioning is to provide glimpses of the future products and services in a tangible form today.
- The future is made visible by the application of designers creative and intellectual capabilities. By creating possible futures, designers trigger a self-fulfilling prophecy. A series of events are put in place intentionally by the designers actions and what they envisage for the future becomes a reality.
- A key way in which designers engage with the future in the design process is visually. Creating visual and convincing visions of the future that translate data into tangible forms. Designers utilise 2D, 3D and increasingly experiential communication to engage with, and communicate ideas about, the future. This is a key aspect of how designers engage with the future.

The above six modes of engagement with the future demonstrate the manner in which designers engage with the future. Many of the above approaches act as capstone to a wealth of engagement approaches and are presented as a means of abstracting specific activities into creative concepts. These engagements demonstrate all phases of the designers process and can operate at a range of levels. Some aspects of this engagement is intuitive and occurs tacitly, while other aspects are applied with intent and wholly explicit in nature.

This section has outlined the ways in which designers engage with the future in the design process and conveys the degree to which this research question has been

answered. The following section will consider the second research question, namely *what futures thinking methods are employed in the design process?*

RQ02: What futures thinking methods are employed in the design process?

A broad range of futures thinking methods are employed within the design process. These methods help organisations to develop an understanding of potential futures and use this to inform decision making in the present.

Designers and futurists can work independently or collectively upon the application of these methods. The key aim of these activities is to assist designers in the development of future products and services. Futures thinking methods can augment and inform more traditional design activities. Key futures thinking methods employed in the design process include:

- Environmental (or horizon) scanning (2.2.7) which involved the systematic review of current development which suggests future changes. Within design projects this can help to inform the fuzzy front end of the design activity. Environmental scanning seeks to consider both global and organisational phenomena that may provide weak signals about the future. It is particularly useful in the formative stages of the design process.
- Trend monitoring (2.2.9) is conducted through watching longer term changes that frequently take place over a number of years. Trend forecasting (2.2.10) uses data to plot changes through time. Trends can be attitudinal, behavioural, or visual. A clear understanding of trends can help to reveal the underlying drivers that are causing change. This understanding is particularly useful to design in new and rapidly changing markets.
- Expert engagement involves eliciting responses from appropriate experts regarding their views of particular issues in the future. This may involve iterative engagement, possibly applying the Delphi methods (2.2.6) developed by Helmer and Dalkey in 1953 (Helmer & Dalkey, 1983). Experts are particularly useful in design in specialist or sensitive areas where it is not possible or feasible for the development team to gain this understanding.
- Expert engagement is extended to include engagement with people who may become future consumers of the products and services under consideration. This form of expert engagement is particularly prevalent in contemporary design practice as it enables the development team to extract insights that can inform project development. If used in the latter stages of the development processes, it can be used to illicit views upon potential products and services. This approach is particularly powerful when employed correctly.
- Scenarios are utilised the design process in a number of ways: i) to convey the narrative of a future context in which a new product or service may be used, ii) to crystallise a glimmer of an idea such that it can be communicated to stakeholders, and iii) used effectively become motivational and inspirational triggers for design

activity. Scenarios can effectively convey meaning and have the ability to make us more open minded to future states.

- Visioning is used in design where a preferred vivid picture is imagined by the organisation. This vision is shared and co-created by stakeholders such that they believe that they can shape it. For a vision to be successful it must be well anchored in the hearts of those who want to make it come true. In design, visioning helps organisations to create an overall strategic direction such that actionable steps can be identified towards the future. These steps are often the agenda to which design resource is deployed to achieve the overall goal.
- Models and simulations are a cornerstone of futures thinking. In futures thinking, modelling involved the use of one thing (the model) in place of something else that is, more difficult or impossible to experience. In design, models - be they physical, virtual or conceptual - provide a vehicle for exploration and communication of ideas. The ability of designers to model or simulate a complex idea and make this into a tangible form is part of the DNA of design.

The above futures thinking methods represent a general view of their application in design. Specific instances result in bespoke futures thinking programmes that address the individual requirements of a given project. Within design, futures thinking method are applied regularly without an awareness of their origins (in futures studies) necessarily being known. The above list denotes a macro-perspective upon futures thinking methods employed in design. It aims to provide a high level analysis of futures thinking methods in design

This section has outlined what futures thinking methods are employed in the design process. It has also outlines the way in which these methods are applied in design contexts. It intends to detail the degree to which this research question has been answered. The following section will consider the final research question, namely *what futures thinking methods do designers employ?*

RQ03: What futures thinking methods do designers employ?

Designers employ a range of futures thinking methods. Many of these methods align with those identified in the previous research question (RQ02) but the manner in which designers apply and use these methods varies. When designers employ methods identified as futures thinking methods, they utilise designerly competencies to augment these methods. As designers have highly developed visual capabilities, these are applied to make tangible future products and services. In doing so, designers bring anticipatory and creative thinking to link the future to the present.

Designers are also able to apply creative and divergent thinking to futures thinking methods which result in an opening up of multiple futures. Through iterative development within the design process, designers can synthesise multiple perspectives

into a coherent whole. This may still involve multiple futures but designers can crystallise this thinking into a coherent entity.

The following outlines what futures thinking methods designers employ within the design process:

- Socio-cultural awareness, through environmental scanning and trend monitoring, enables design to develop awareness of attitudinal, behavioural and visual trends. These activities may be undertaken by a designer who is culturally sensitive to the changes in the zeitgeist, trend awareness is an important factor in the contemporary designers arsenal.
- Scenarios are used as a mechanism for communicating possible future contexts, products or services. In design, a scenario can refer to a simple concept drawing accompanied by some descriptive text or refer to a highly professional experiential movie. The aim of scenarios is to convey to stakeholders and aspect of a future product or service.
- Within design, visioning is akin to concepting. In this activity, desirable visions of the future are generated and, if approved by decision makers, a plan of action is put in place to achieve this vision. The concepting process draws upon a base of research to inform its direction. Visioning, or creating future concepts, is a core aspect of design.
- Models and simulations provide designers with a powerful means to make the future tangible. Designers create models, physical, virtual or conceptual, as a means of communicating their visions of the future, and use them to illicit feedback. Design has a long history of using models and simulations to communicate their visions of the future. For example, Expos are large public exhibitions which are utopian in scope, focus upon technology and innovation, and address issues of humankind. Expos provide design with an opportunity to simulate their visions of the future such that attendees can experience a snapshot of the future.

An underlying principle of the way in which design explores the future was captured succinctly by Raymond Loewy (1951) with his MAYA concept. He maintained that the role of the designer was to develop the most advanced product that research could develop and technology can produce, but importantly accepted by consumers – the most advanced yet acceptable concept. This approach is still relevant in the 21st century.

This section has discussed the futures thinking methods designers employ. It has stated that futures thinking methods are augmented by designers, drawing upon their specific creative and visual capabilities to effectively communicate their visions of the future. This section has intended to describe the degree to which this research question has been answered.

6.1.5 Summary

The preceding two main sections (6.1.3 and 6.1.4) have discussed the research findings. Firstly research findings of the research propositions were presented and discussed. This sought to detail to what extent the research propositions have, or have not, been supported by the research findings. With the noted exception of RP03, all research propositions were supported by the research findings. RP03, *namely there are no commonly accepted approaches in futures thinking in the design discipline* has, through the activity and resultant research findings has not been supported. It can now be demonstrated that there are commonly accepted approaches in futures thinking in design. The design futures framework reveals some of these commonly accepted approaches.

Secondly the degree to which the research questions have, or have not, been answered by the research findings was discussed. It is contended that the research contained within this thesis has answered the original research questions. Research findings (in chapter 04 & chapter 05) demonstrably answer these research questions.

The following section will describe the claimed contribution to knowledge that this research has made.

6.2 Contribution to knowledge

This section aims to communicate the contribution to knowledge.

6.2.1 Statement of the contribution to knowledge

One of the motivations for conducting this research was the limited literature available which specifically dealt with the role of futures thinking in design. This gap in knowledge was a principle motivation for this research (as outlined in sec.6.1.1). It is in this context that the contribution to knowledge is stated as a framework that communicates a representative picture of the role of future thinking in design.

This claim of contribution to knowledge is made based upon the development of the research findings and subsequent validation through empirical research. The author contends that this contribution to knowledge can be defended through the rigour of the research approach and associated methodology.

6.2.2 Justification of the claim of contribution to knowledge

The justification of the claim of contribution to knowledge is based primarily upon certain conceptual assumptions. In the case of this research, it is based upon the conceptual assumption of 'creating new understanding of existing issues' (Trafford & Leshem, 2008).

In this thesis the existing issues concerned the approaches designers use to consider the future within the design process. The author conducted and published research in this

area before commencing this doctoral study. This research identified limited academic work in this area, designers do employ futures thinking approaches within design activity. It was clear from the literature and discussions with practicing designers that futures thinking is not a field that they were knowledgeable of.

The claim of contribution to knowledge is based on the conceptual assumption of creating new understanding of an existing issue, i.e. the role of futures thinking in design. The research was conducted through a series of interrelated stages as outlined in chapter 03 (see fig.3.1 for a summary of the research process).

This claim of contribution to knowledge is supported by the dissemination of aspects of the conclusions of this research. Since commencing this PhD the author has published two journal articles and three refereed conference papers. In addition one book chapter, one journal article, and one refereed conference paper are *in press* (see sec.1.5.1 for full details). The above publications aim to demonstrate that this research has already contributed to the corpus in the scholarly arena.

6.2.3 Beneficiaries

The anticipated beneficiaries of the research were initially stated in sec.2.0 as a background to the motivation for undertaking the study. The following reiterates and expands upon the beneficiaries of the research. The beneficiaries of the design futures framework are presented thus:

Beneficiaries of the framework:

- *The Author:* The research and resultant design futures framework has benefited the author in that it has provided empirical evidence for something that was previously tacit and based upon personal experience, intuition and gut instinct.
- *The Design Industry:* Design practitioners who undertake, or wish to undertake, development of next-next generation products and/or services.
- *Stakeholders in New Product Development:* By providing an explicit and communicable approach to the development of next-next generation products and services, a variety of stakeholders will be utilise the framework to guide their NPD activities. These include marketers, business strategists, engineers, financial planners, and resource managers to name a few.
- *Users:* Users will benefit from the development of fit for purpose next-next generation products and services.
- *Futurists:* People interested in the future, who may or may not be professional futurists, will benefit from the framework as it provides a structured approach to how design engages with the future – an area that has limited academic attention.

Beneficiaries in education:

- *Students:* Design students will be able to utilise the framework within design projects when considering extended time horizons and/or future based issues.

Additionally, students in cognate disciplines, such as marketing and engineering for example, will be able to understand a design perspective upon the development of next-next generation products and services.

- *Design Educators:* Individuals involved in design teaching will be able to utilise the framework to support student learning in a variety of design contexts.

Beneficiaries in research:

- *Academics:* Academics interested in the future, be they in design or not, will benefit from the manner in which the framework demonstrates a new relationship between theory and practice in design. This relationship has previously been held tacitly by designers and researchers.
- *Researchers:* Researchers who wish to understand how design approaches the future within design activity can use the framework to assess the interrelated nature of these activities. This may also inform *praxis* discourse- the interrelation and intersection of theory and practice.

6.3 Limitations of the study

The study has limitations. This section considers the limitations of the research. It has two main objectives:

- 1) To draw attention to factors that affect the confidence with which the research findings can be considered, and
- 2) To consider the extent to which the research findings may be generalised

6.3.1 Consideration of limitations

Four limitations are considered:

Limitation 01: Size and composition of the sample

The total number of interviews undertaken was officially 31 and the total number of interviewees was 42. This includes the validation interviews. This sample was relatively small, geographically limited to the UK and USA, and as such may not be representative of the design sector.

The total number of interviews conducted for the validation of the framework was four and the total number of interviewees was nine. If time permitted, it would have been desirable to conduct additional validation interviews.

Limitation 02: Research design

The research method was qualitative in nature. A mixed-method research approach would have enabled the triangulation of research findings. Section 3.1.3 considers the merits of adopting a mixed-method approach but identified the challenge of obtaining a quantitative data set. It may have been possible to use survey research within the

validation of the framework and thus conducted a mixed-method approach. The interpretative nature of the research analysis could be considered subjective.

Limitation 03: Restricted access to research data

As the study engaged with commercial design organisations, access to commercially sensitive data was problematic. Some interviewees were not willing to provide the author with materials to take away from the interviews that, in their opinion, may offer advantage to their competitors. For example, interviewees often utilised examples of their research and design work during interviews but they were not willing to provide the author with copies for the purpose of this thesis. The aim of this study was to investigate the role of futures thinking in design and as such the focus of the research was upon the *process* rather than the *outputs* of future oriented design activity.

Limitation 04: Coding of the data

It is important to understand that some of the coding decisions were made based on the previous experiences and tacit knowledge of the researcher. Complete independence of the research from the researcher is noted by numerous commentators as problematic and almost impossible (see Bryman (2008), Creswell (2009), Miles & Huberman (1994), and Robson (2002) for a detailed discussion of the challenge of independence of the researcher from the research). This issue was in part addressed by the use of experts within the validation of the design futures framework and thus emphasises the importance of the validation activities. This approach aimed to provide independent views upon the research such that any bias of the researchers is 'checked'.

Although three potential limitations with regard to this study have been identified, there are no grounds that that these limitations have significantly impacted upon the research findings. The strength of this study was that the author has developed an in depth and broad understanding of various approaches that designers use to consider the future within the design process. This research has also enabled the development of a broad understanding of the use and role of futures thinking methods in design. This research offers a base for other researchers to carry out additional research dedicated to the role of futures thinking in design.

6.3.2 Generalizability of the research findings

Any claim of generalizability needs to consider the reliability and validity of the research findings. Hammersley provides useful definitions for reliability and validity with regard to research findings:

Reliability refers to the degree of consistency with which instances are assigned to the same category by different observers or by the same observer on different occasions. (Hammersley, 1992:67)

By validity I mean truth: interpreted as the extent to which an account accurately represents the social phenomena to which it refers. (Hammersley, 1990:57)

Reliability and validity are often difficult issues in qualitative methodology (Silverman, 2005) as there is no guarantee that the research data is valid and the reflection of a situation (Holloway, 2002). Trafford and Leshem (2008) claim that if a deductive research approach was used, conclusions would be high in reliability but low in validity; while if an inductive research approach was used, conclusions would be high in validity but low in reliability. They add that you can generalise from your conclusions if a deductive (theory testing) approach was used, but it is more difficult when an inductive (theory building) approach was adopted.

This study employed both an inductive and deductive research approach (sec.3.1.4) to theory generation. The research approach involved a number of participants in the generation and validation of the research findings and development of the framework. The design futures framework aims to reveal the role of futures thinking in design on a conceptual level and intends to represent generic aspects of the ways in which designers consider the future in the design process. The author asserts that the design futures framework represents generalizable conclusions from the research. Noblit and Hare (1998) contend that the generalising process is far from mechanical and is 'more like translating, refuting, or synthesising studies. It is careful interpretation, not just adding up'.

6.4 Agenda for further research

In the process of conducting this investigation the need for further research has been recognised. Time constraints, the nature of doctoral study, and lack of opportunity prevented the inclusion of these topics in this study. It is also recognised that the nature of the topic and methodology impact upon the agenda for further research.

During the development and conduct of this research the overall aim of this thesis was to develop and understanding of the role of futures thinking in design. This has been achieved. Additional research is desirable to progress the findings of this study further:

- Exploration and testing of the framework in a real world design setting would provide valuable further insight into the role of futures thinking in design. This approach, ideally conducted in/by contemporary design practice would help to increase the applicability of this research to design practice. Commercial sensitivities would need to be resolved if case material were to be produced.
- Further validation of the framework could be conducted through survey research. This would potentially provide a broad sample that could increase input from a variety of design specialisms and address the geographic bias of this study.
- The manner in which designers augment futures thinking approaches and apply them in the design process would benefit from specific investigation. This process of adoption and adaption of approaches from one field into design (in this case

futures thinking) may enable generalizable theory to be generated about the way designers borrow tools and techniques from other fields.

- The potential to link the way in which designers consider the future could be linked to specific research agendas. For example, studies could be conducted into the demands increasingly being placed upon designers to address climate change and sustainability issues. This approach could be extended to such issues as the role of design in wellbeing, service design in public services, and design driven innovation for example. What this approach seeks to do is to link thematic areas with the future through the application of design led futures.

The above listed agenda for further research ultimately aims to set a more precise boundary of design led futures. Additionally this future research agenda would also distinguish the boundary between design thinking and ways designers think about the future.

This section has discussed an agenda for future research resulting from this research. Four potential areas were identified, specifically: a study undertaken within a design practice setting, survey research to further validate the design futures framework, investigation into how designer's augments futures thinking approaches in the design process, and exploration of societal issues through the application of design led futures.

The following section will provide concluding remarks to the body of research contained within this thesis.

6.5 Concluding remarks

This research has revealed the role of futures thinking in design, and contributes to understanding the ways in which designers consider the future in the design process. The study identifies the increasing need for organisations to consider the future within an increasingly complex and competitive developmental landscape.

Understanding the future is important to design. In 1975 Cross, Elliot and Roy claimed that 'visions of the future are particularly important for designers, because designers have to imagine both the future conditions that will exist when their designs actually come into use and how those conditions will be changed by the creation of their new design' (Cross, Elliot & Roy, 1975). This claim is now more than a third of a century old but seems increasingly relevant to design in the sustainability-challenged, technology-driven, complexity-dominated, post-convergent 21st century.

The evidence generated through this research provides a design futures framework that can assist design in the development of desirable visions of the future. Designers consider the future as an intrinsic aspect of the design process. This research has

confirmed this proposition. Perhaps the spirit of this thesis is concisely summarised in the following:

Designers by the nature of their work are futurists. The least time it takes to produce a product and get it on the shelf is a couple of years. Sometimes it can be 10-15 years. So you're already dealing with the future when you sit at your desk in the morning.
(Seymour, 2010)

After conducting the research contained within this thesis, an important reflection is that of the increasing importance of what the author terms *strategic futures*. Organisations are increasingly recognising the need to anticipate what is new and next in the world. This anticipatory inquisitiveness is driving a new form of future oriented activities – a structured and multifaceted attempt to understand and ultimately create visions of, and about, the future. Strategic futures is not about divination and prophesy, rather it is about opening up structured and replicable ways of knowing that combine to create a new form of contemporary future-creating practices. Strategic futures involved a change in our relationship with the future as it places people in a decision making space where we must consider the future as an eco-system that we can meaningfully engage in. As the mediator between the present and the future, design can facilitate the discourse between stakeholders in the development of strategic futures.



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Appendices

- A.1 Interview guide for first round of interviews
- A.2 Interview guide for design futures framework validation interviews
- A.3 Initial design futures framework elements utilised in validation interviews
 - A.3.1: Familiarisation, orientation, and immersion
 - A.3.2: Design futures research process
 - A.3.3: Synthesis and transformation
 - A.3.4: Communication

A.1 Interview guide for first round of interviews

Interview Guide

Time: 45 minutes

Mode: Face-2-face

Outline Questions:

1. Tell me about your organisation (size, age, number of employees, history, markets operating in, etc)? Describe your role in your organisation?
2. Describe a typical project in your organisation? (length, amount of resource required, staff expertise including background, formal training, how communicated, etc)?
3. What do you think designers do when designing?
4. What is the approach to design within your organisation? Is there a core design ethos? If so, what is it? If not, why?
5. Is there a design process within your organisation that is normally followed (model design process)?
6. What resources do designers draw upon when undertaking the design process within your organisation? Where does the information come from that informs design activities?
7. Is the future something that you think about when designing?
8. Do the designers/your organisation consider the future as a core activity in the design process? If so, how? If not, why?
9. If respondent answers yes to 7: What resources do designers in your organisation draw upon when considering the future in the design process?
10. If respondent answers yes to 7: Is information that is used to consider the future collected in your organisation or by external agencies? If so, how, why (methods used)?
11. If respondent answers yes to 7: What methods do designers in your organisation use to consider the future in the design process? Are these commonly used in design activities?
12. What information is useful when considering the future in design activities?
13. What knowledge is useful when considering the future in design activities?
14. What is the difference between information and knowledge?
15. When designing, are designers within your organisation thinking of the 'now' or the 'future'?
16. Are the methods used by designers to consider the future different to methods used by external agencies/experts? If so, how, why?
17. How does your organisation communicate 'futures thinking' outputs, such as trends and forecasting, to third parties?
18. How do you describe the activities that your organisation undertake to consider the future to clients (how is it marketed/externalised)?

19. Has there been a change in the way design organisations consider the future within the design process? If yes, less, same, more?
20. Does the typical project that you described earlier (Q.2) provide a good illustration of futures thinking in the design project? If not, can you describe a typical project that considers the future (if appropriate). (Length, amount of resource required, staff expertise including background, formal training, how communicated, proportion of overall project dedicated to forecasting, etc)?
21. How do you think your organisation will make its money in the future?
22. What do you understand by the term 'blue-sky' or 'blue-sky thinking'?
23. AOB (contacts, suggestions, follow up)?

A.2 Interview guide for design futures framework validation interviews

Interview Guide

Time: 45-60 minutes

Mode: Face-2-face expert interview with visuals of framework elements as prompts (see appendix A.3)

Outline Questions:

1. Tell me about your organisation (size, age, number of employees, history, markets operating in, etc)? Describe your role in your organisation?
2. Describe a typical project in your organisation? (length, amount of resource required, staff expertise including background, formal training, how communicated, etc)?
3. How does your organisation engage with the future within design projects? Do the designers/your organisation consider the future as a core activity in the design process? If so, how? If not, why?
4. < Outline design futures framework and introduce individual elements. Ask respondents to discuss. > Use questions below as prompts in response to framework - compare and contrast:
5. What aspect/s of the framework aligns with approaches used in your practice? (Get respondents to discuss the detail of their activities in response to framework)
6. What aspect/s of the framework does not align with approaches used in your practice? (probe for specific issues/instances)
7. What resources does your organisation utilise when undertaking future oriented projects? Are these evident in the framework? If so, what? If not, why (and what are they)?
8. What is the role of primary research in your organisation? What methods are used (describe/examples/challenges)? Describe its use and value in your activities?
9. What resources do designers in your organisation draw upon when considering the future in the design process? Are these evident (or not) in the framework?
10. Is information that is used to consider the future collected in your organisation or by external agencies? If so, how, why (methods used)?
Partnerships/collaborations?
11. What methods do designers in your organisation use to consider the future in the design process? Are these commonly used in design activities?
12. How does your organisation communicate futures thinking outputs? What communication is required?
13. Strategy vs. future thinking (design thinking)?
14. Has there been a change in the way design organisations consider the future within the design process? If yes, less, same, more?

15. How do you describe the activities that your organisation undertake to consider the future to clients (how is it marketed/externalised)? (Marketing/promotion/use of exemplars)
16. What is your overall response to the design futures framework? Is there value in this approach? (Ask for specific details)
17. AOB (contacts, suggestions, follow up)?

A.3

Initial design futures framework elements utilised in validation interviews

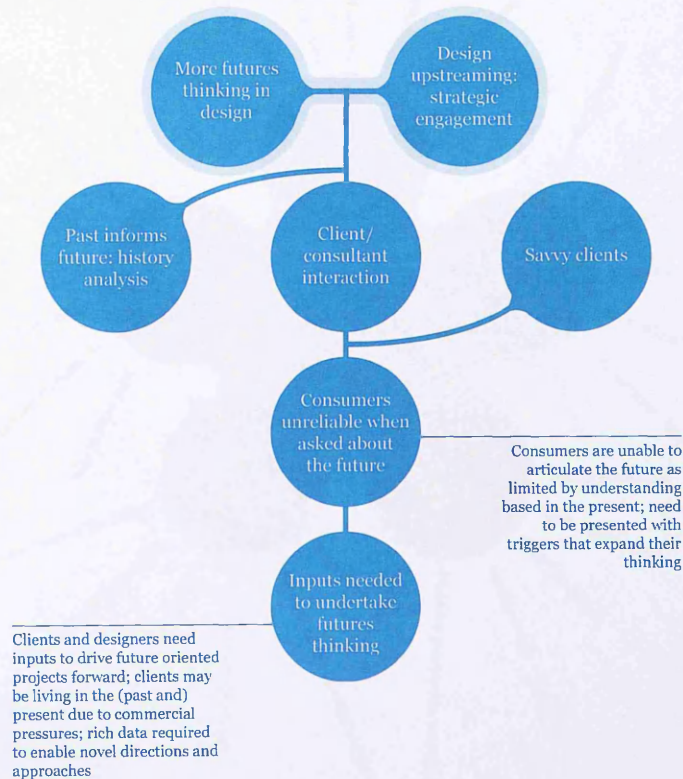
The initial framework elements were:

- 1) Familiarisation, orientation, and immersion (A.3.1)
- 2) Design futures research process (A.3.2)
- 3) Synthesis and transformation (A.3.3)
- 4) Communication (A.3.4)

Design Futures: Familiarisation, orientation, and immersion

Summary

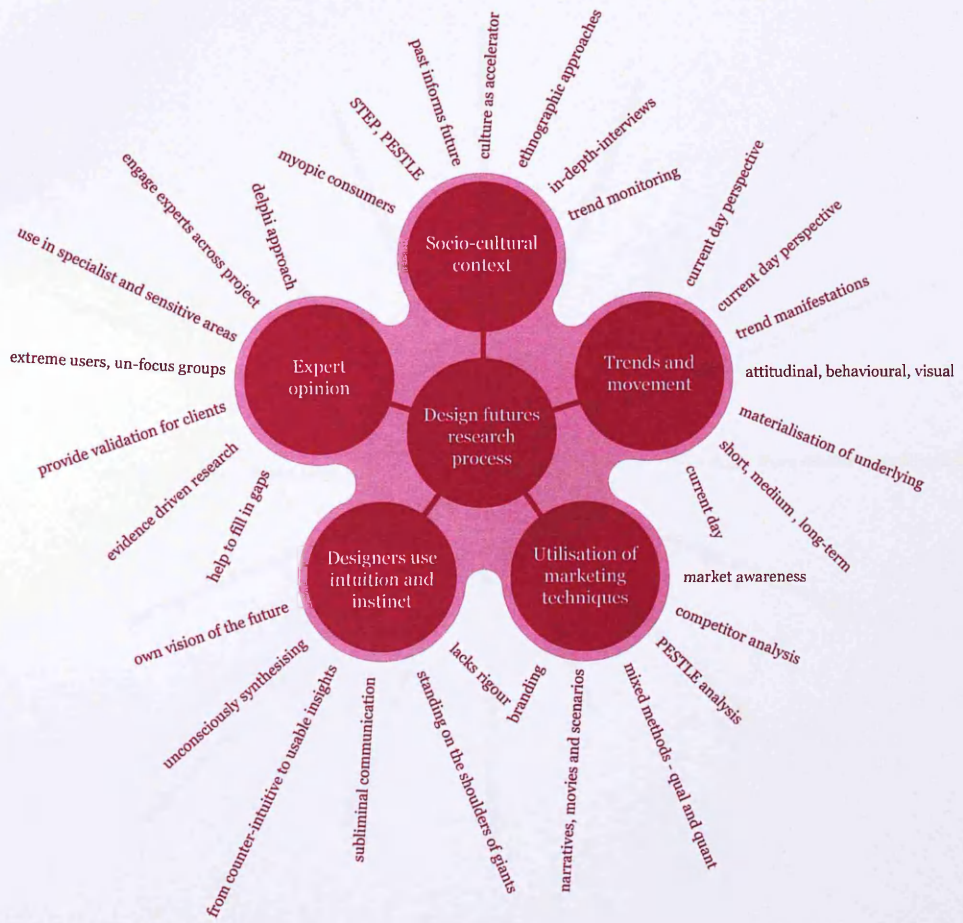
Futures thinking approaches increasingly being employed in design alongside the up-streaming of design (strategic engagement). Traditional market research unreliable as consumers' perspective restricted by own understanding and horizons so range of inputs needed to drive project forward. Need for inputs that consider feasibility of available opportunities (technological focus), the viability of possible trajectories (business focus), and the desirability of potential proposals (user/consumer focus).



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Design Futures: Design futures research process

Summary Integrated set of research activities undertaken throughout design projects by both designers and researchers. No single approach prevalent but a set of interrelated activities that assist in the consideration of barriers and drivers for future oriented design-led projects.

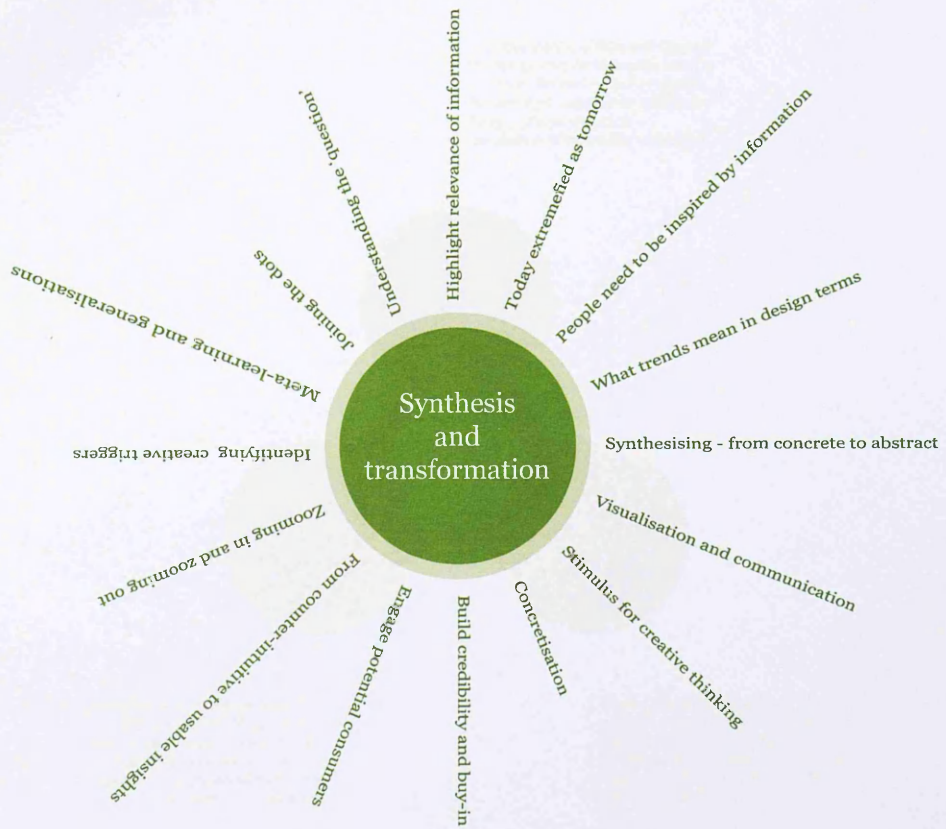


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Design Futures: Synthesis and transformation

Summary

Synthesis and transformation of research data and insights into knowledge for design and development team. This process involves numerous stakeholders and results in the translation and transformation of abstract and counter-intuitive information into concrete, actionable and useful knowledge. Relies on both structured and intuitive engagement. Key aim is to provide strategic roadmap and implementable action plan. Process not clearly articulated.



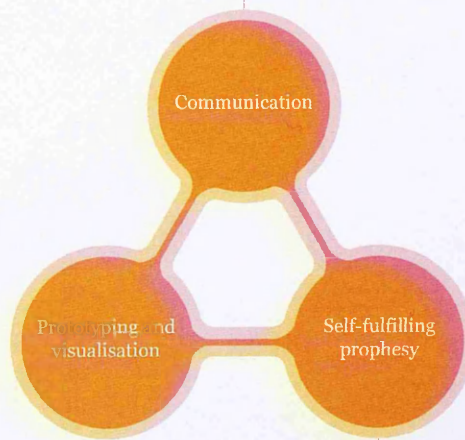
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Design Futures: Communication

Summary

Communication is key factor that designers can bring to future oriented projects - this may be design's differentiator. Visually driven communication strategies lead to a point of inspiration, often employing sensory and pithy presentations - movies, online, visualisations, and prototypes. Communication enables consumers' views to be assessed as well as preparing and testing the market for future products and services

Communication within and beyond the design and development team is essential. Needed to make tangible the activities undertaken within the design futures approach - translation of intangible to tangible.



Prototyping and visualisations key skills employed by designers to concretise the future. Allows views and opinions to be drawn as well as powerful tool to get people behind concept of the future.

Future-oriented 'normative' activity where actions decide and shape the future. Designers are able to set agendas and create the future, the 'build it and they will come' approach.

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