**Loughborough Design School**

# TOWARDS AN UNDERSTANDING OF HUMAN BEHAVIOUR FOR DESIGN ACTION

**By**

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## Abstract

It can be shown that exceeding both utilitarian and hedonic needs of consumers leads towards greater satisfaction, delight and enduring consumer loyalty. If designers are to meet the progressively diverse needs of consumers, then access to consumer values, aspirations and the underlying logic of their social practice become increasingly important.

If we accept that what people say, do and think are often different things, gaining access to these requirements is clearly a challenge. The challenge is not only concerned with how these requirements are accessed at source, through widely adopted ethnographically inspired techniques, but more towards how these requirements are communicated to the designer.

There is a clear disconnect between the collection of consumer requirements and how these requirements are arranged and communicated as implications for design.

This thesis details a governance framework for the output of ethnographically inspired research methods to provide an understanding of the arrangement and attributes a communication tool for ethnographic work should possess, particularly towards the more technical area of new product development. The framework bridges a gap between consumer research and design action, which may be used as an approach to facilitate innovation, targeted problem solving and offer creative direction for new product development.

Following an exploratory review of the literature and a series of way-finding interviews with domestic appliance and consumer goods manufacturers, a pilot study was conducted to identify the philosophical and practical barriers faced by designers, when designing for consumer requirements beyond the functional.

A detailed second level literature review explored the emergent themes and led towards a desktop review of over 30 different creative thinking design tools from the design & emotion movement, 24 different communication approaches for ethnographic work in design and a two year case study on communication within the design process.

## Keywords

Industrial Design / Design Strategy / Consumer Experience / Emotion / Innovation / Requirements Capture / Communication / Ethnography / Systems-Thinking / Design Psychology

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## 1.0 Introduction

There has been and continues to be a growing demand to focus on ‘design & emotion’ and consumer pleasure as central drivers behind consumer loyalty. This focus does not always appear to extend towards the more technical domain of Engineering Design, a field that would greatly benefit from the consideration of more than the immediate utilitarian requirements, even where the end user may not always be apparent.

Designing for emotion is based on the concept of ‘designing’ for attachment through delight as a result of exceeding expectations within a hierarchy of product needs. This hierarchy comprises of utilitarian and hedonic concerns of consumers and the wider global concerns associated with new product development. Within the creative process of new product development, seeking to understand these latent needs, the underlying logic of social practice, peoples’ values and their aspirations remains a challenge. As the design community truly aspire to design better, more inclusive products these barriers must be addressed.

Consumers have needs, wants and desires of which they themselves are often unaware. To design for the inclusion of these latent needs, often revealed through our actions rather than our intentions is the path to exceeding expectations; this is not achieved by providing more of what consumers ask for but also what they didn’t know they wanted in the first place.

The methods of collection, analysis and communication for User/Consumer Insight (U/CI) are central to the successful integration of U/CI within the process of designing for consumer pleasure, which is reliant upon meeting and exceeding a complex combination of expectations.
Even though what once delighted may now be taken for granted, usability and functionality remain the entry fee for product success and at no point throughout this research is this overlooked.

Anthropological inquiry and its ethnographic techniques have been adopted within the design domain as a form of user/consumer research to identify consumer preferences revealed through their behaviour. The preferences highlighted by this method of research are those that must exceed in order to delight the consumer. Ethnographically inspired techniques, increasingly the preferred choice within the design community, are methods in which data are collected, interpreted and communicated from a reflexive perspective, leading towards a summary of likely implications for design. These summarised implications are subject to interpretation, yet appear to lack any organised analytical component, either specific to subject based themes or to highlight the underlying logic of social practice. The approach to how these insights and implications are

summarised, arranged and subsequently communicated are crucial for their successful integration into design solutions.

Greater knowledge of the required attributes for a communication tool to successfully portray the results of ethnographically inspired techniques, will enhance researcher's and designer's ability to bridge the gap between consumer research and design practice, promoting more inclusive design and enduring consumer loyalty through positive pre and post consumption experiences.

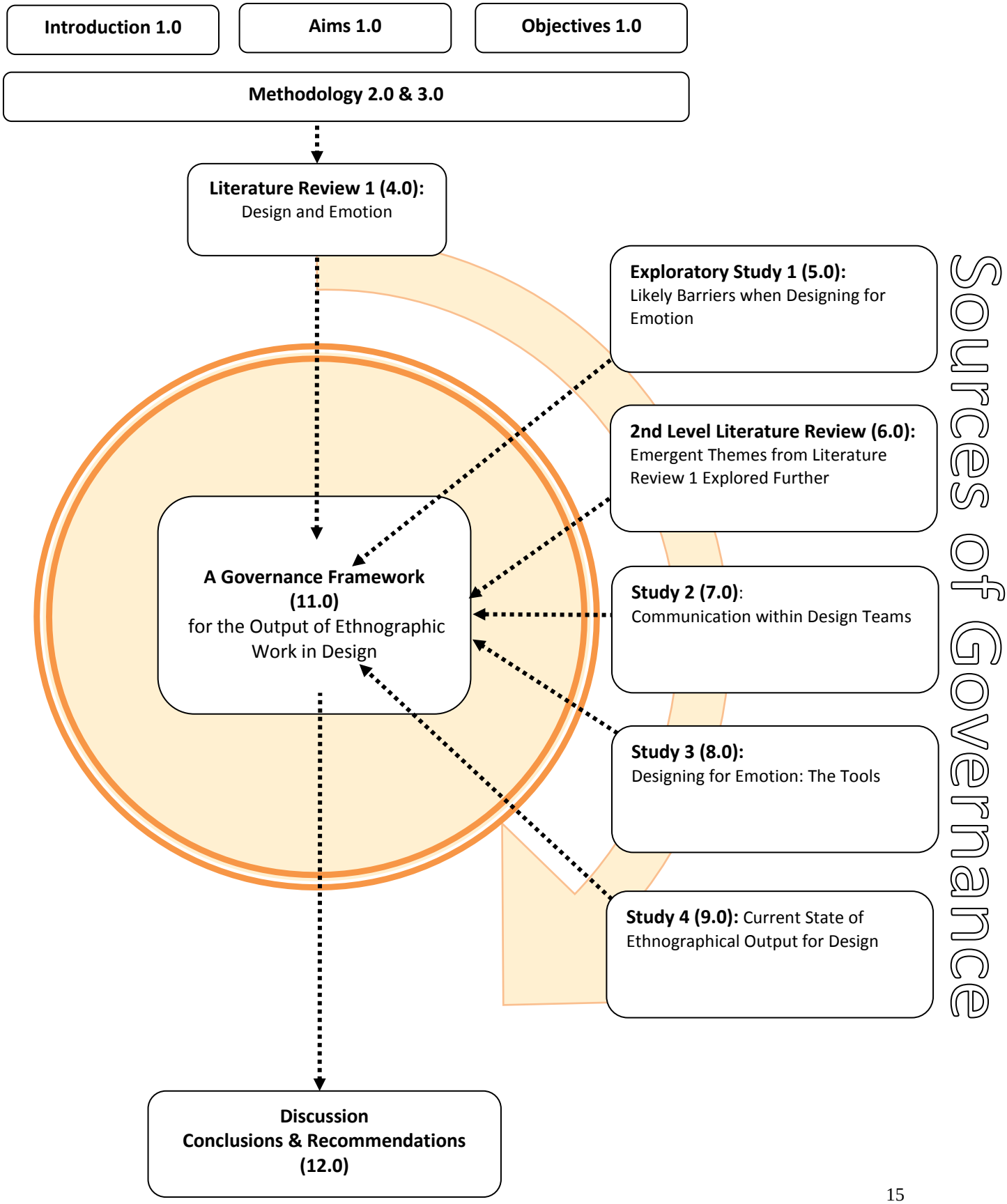
This thesis includes a table top review of over 30 different creative thinking design tools from the design & emotion movement and 24 different communication approaches for ethnographic work in design, a two year case study on communication within the design process for a small to medium design and technology company, and the results of a focus group and survey on the philosophical and practical barriers faced by designers when designing for these less tangible consumer expectations. The thesis concludes with a governance framework for the arrangement and output of ethnographic work to inform design practice.

The governance framework presented in this thesis promotes a particular way of thinking for the development of new technology and the emotional appeal of that technology to delight the user. The framework is not in itself a tool-set but a philosophy upon which future tool-sets may be built to facilitate innovation, targeted problem solving and offer creative direction. The framework offers a platform upon which future tools and methods may be developed to promote, better, more inclusive design and compelling experiences for the consumer. The framework comprises a unified approach to traditional ethnographic methods and systems thinking as a type of 'Action Ethnography' to bridge the gap between consumer research and design action.

Whilst there are strong industry based connections throughout this doctoral thesis, this PhD research programme has been directly funded exclusively by the author. The organisations involved did not commission this research programme and were not requested to do so. However, at the time of writing this thesis the author was a full time employee of the organisation presented within the case study, chapter 7.

The main outcome of this research, the multi-source governance framework, is the result of a soft systems approach to problem solving for valid research, triangulated from several sources, grounded in data and assessed against a social research validity matrix. Please see the content diagram over-leaf (figure 1-1), which represents not only the contents of this thesis but also the research logic and the sources from which the governance framework has been created. This content diagram can be used to guide the reader through this thesis and offers a top down view of the research programme.

**Figure 1-1: Content Diagram**



Through a critical review of the literature relating to the domain of Design & Emotion the common theme of exceeding consumer expectations emerged. Through examination of the literature and a desktop review of over thirty tools used to design for emotion there appears to be little guidance on how consumer expectations are arranged and actually communicated to the design practitioner.

A second phase of the critical review identified anthropological inquiry and its ethnographical output as one of the preferred collection methodologies within the design domain for contextual inquiry and thus a reasonable basis upon which to develop an approach for the study and communication of user/consumer behaviour.

The research recognises a lack of guidance available for the communication of latent consumer expectations and their needs beyond the functional. Further guidance to provide an understanding of the attributes product designers require, from tools intended to communicate consumer requirements, would clearly be of great value to the domain.

The reflexive, perspectival nature of anthropological inquiry as a 'field-based study' approach to collect data about a particular culture or community, whilst providing valuable information, appeared to lack any systematic critical analysis when adopted within the design process. The complexities of interpretation and the communication output of anthropological inquiry, herein referred to as ethnography, presents real challenges in the arrangement and communication of true consumer requirements to design teams.

A critical multilevel review of the literature and a series of pilot and exploratory studies identified, not only the importance of effectively communicating User/Consumer Insight (U/CI), but also opportunities to improve the current arrangement and communication of U/CI to designers. These findings have been compiled into a framework upon which future U/CI communication tools may be developed.

**The reader of this thesis will gain an awareness of:**

- The creative tools used to develop emotionally engaging products.
- Ethnographic and ethnographically informed inquiry methods, tools and techniques.
- Opportunities for communication improvement within design teams.
- The practical and philosophical barriers faced by designers when designing for emotion.
- Key governance when creating and developing communication tools for ethnographic and field based work in design.
- Applied systems thinking in research and design.
- A framework for valid social research.
- Developing a receptive mindset towards observational consumer research and its successful implementation.

**The emergent themes from the literature comprise:**

- Designing for emotion is about designing for attachment through delight, by exceeding expectations.
- What people say, do, and think, are often different things.
- Context is fundamental to understand and design successfully for the consumer.
- Ethnographically inspired techniques are increasingly the preferred choice of the design community.
- The arrangement and communication format of U/CI (User Consumer Insight) to Designers needs attention.

## 1.1 Aim & Contribution to Knowledge

The direct aim of this thesis is to provide an understanding of the arrangement and attributes a communication tool, for ethnographically inspired work should possess to support design action

Benefits arising from this knowledge contribution comprise not only a series of guidelines for the arrangement and output of ethnographic work within the design process but could also be interpreted as a series of recommendations on how Anthropologists might attend to the needs of designers through their ethnographic practice, not just in how they communicate, but how the work is performed. The framework is also equipped to foster innovation and offer guidance when exploring opportunities within a problem area or particular contexts for creative direction of targeted problem solving.

This research may be of further value to other non-ethnographically inspired consumer research modes and scenario based professions for the ongoing development of their own communication strategy. The framework can perform as a source of guidance for designers in receipt of consumer requirements; how to think about the data they receive and work with it.

Furthermore, the framework presents an opportunity for the adaptation of other existing communication formats such as QFD, Scenarios, and Personas to develop access portals into the analytical component of their work.

## 1.2 Research Objectives

- To review the literature relating to the origins and development of design and emotion (See 4.0).

- To explore the practical and philosophical barriers faced by designers when designing for emotion (See 5.0).

- To review the literature pertaining to emergent themes arising from 4.0 + 5.0 (See 6.0).

- To explore the flow of communication within a 'real world' design team (See 7.0).

- To identify the current state of tools and methods used by designers when designing for emotion. (See 8.0).

- To critically review the tools and methods to establish how designing for consumer pleasure is approached, how consumer requirements are gathered, interpreted, communicated, integrated, evaluated and revised. (See 8.0).

- To identify the design communities preferred approach to requirements capture, communication and use. (See 6.0 & 9.0).

- To explore the current state of the preferred requirements capture and communication approach for design (See 9.0)

- To elicit the arising strengths and opportunities from the above research to form a unique governance framework for requirements capture, arrangement and communication when designing for emotion. (See 11.0)

## 1.3 Research Questions

- What service does a U/CI communication tool need to provide?
- What are the barriers with U/CI communication?
- What are the desired attributes of a U/CI communication tool?
- What are the limitations of this study?

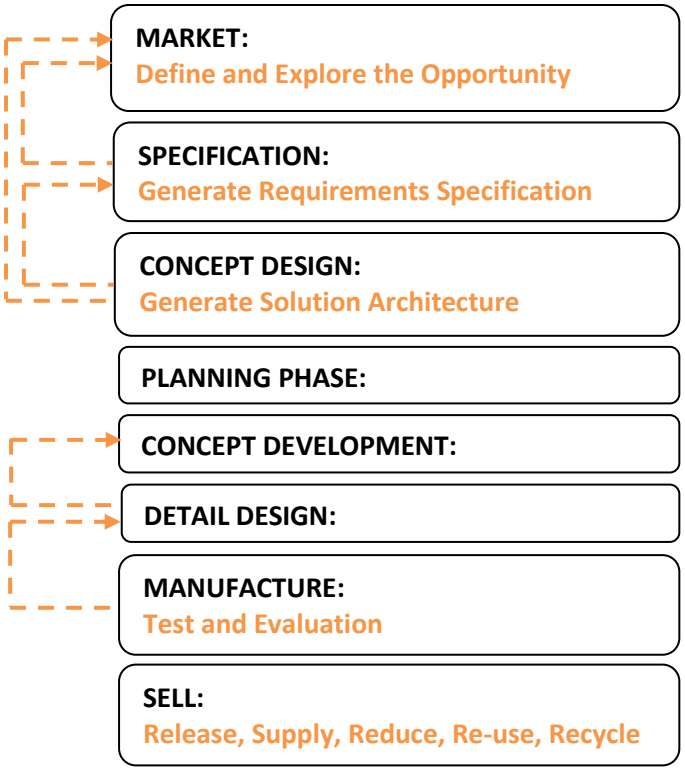
## 1.4 Scope

This research programme is positioned towards the technical domain of engineering design and the emotional appeal of new technology to satisfy and exceed the utilitarian and hedonic expectations of the user/consumer. The user or consumer is considered as any stakeholder that interacts with or ultimately 'consumes' the product.

Whilst the emotional appeal of new technology may largely be considered for the interaction between user and technology, this research programme considers also the benefit of delightful design, even when the end user may not be apparent. The pathway to this delightful design relies upon a thorough understanding of the user, clear requirements and exceeding those requirements. It was emphasised by Cross (2010), that engineering designers continue to receive poorly defined problems even though they are expected to develop well defined solutions. The resulting framework seeks to address these concerns, to successfully capture and transform user requirements into design solutions with a particular emphasis on the emotional needs of the user as revealed through field based research methods such as ethnographic inquiry.

The governance framework promotes a particular way of thinking for the development of new technology and the emotional appeal of that technology to delight the user. The framework is not in itself a tool-set but a philosophy upon which future tool-sets may be built to facilitate innovation, targeted problem solving and offer creative direction when seeking to respond not only to the utilitarian but also the hedonic needs of user/consumers.

**Figure 1-2: Model of a Typical Product Design Process**




The primary agents of this research programme comprise the Consumer, the Engineering Designer and Researcher. Each of these agents are involved in the core activity of engineering design and the translation of U/CI throughout the design process shown above (figure 1-2) adapted from Pugh (1991).

## 2.0 Research Methodology

The selected research methods employed to meet the aims and objectives of this study support the contribution of both fundamental and applied knowledge through the generation of theory and the assessment of its suitability for practical application.

Research can be broken down into two modes (Van Aken, 2001). Mode One Knowledge production is often carried out within an academic environment focusing on fundamental knowledge, and Mode Two Knowledge production is more solution focused, not only addressing the analysis of problems, but also, designing solutions. Trandisciplinary in nature, Mode Two research can be characterised by the constant reciprocal flow between the fundamental and the applied.

## 2.1 Research strategy

> "Research is not a clear cut sequence of procedures following a neat pattern but a messy interaction between conceptual and empirical worlds, deduction and induction occurring at the same time"
>
> (Bechhofer, 1974, p.73).

As suggested by the above quotation, there are a wide variety of approaches to social research and whilst they may not follow a set of rigid guidelines, they do however, according to Gill and Johnson (2006), follow a shared problem solving sequence.

This PhD adhered closely to the sequence below proposed initially by Howard and Sharp (1983) adapted from Rummel and Ballaine (1963) as cited in Gill and Johnson (2006).

1. Identify Broad Area
2. Select Topic
3. Decide Approach
4. Formulate Plan
5. Collect Information
6. Analyse data
7. Present Findings

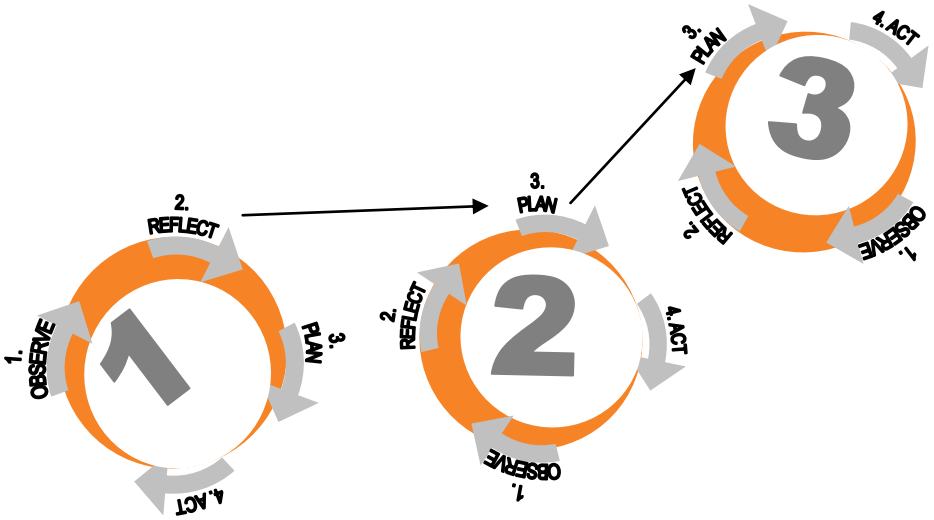
The following characteristics of Mode Two research proposed by MacLean, MacIntosh and Grant (2002) were used to support and guide the research design and remain evident throughout this thesis.

1. Support knowledge production through application.
2. Encourage a trandisciplinary approach: Integrating multidisciplinary skills and knowledge in a framework of action (Gibbons, Limoges, Nowotiny, Schwartzman, Scott, Trow 1994).
3. Rely on heterogeneous and organisationally diverse teams to focus on the problem.
4. Remain socially accountable and adopt a reflexive approach to yield greater understanding of the research process.
5. Include diverse quality controls. Address the practicality of the solution proposal.
6. Remain aware of the external relevance problem. To be relevant both in theory and practice; academic and practitioner domain (Van Aken, 2001).

### 2.1.1 Research Framework for Action

Action Research is a suitable methodological framework to address both modalities of the research goals, with action and research respectively accounting for the practitioner and academic approach: Mode One and Two discussed above. Kurt Lewin (1946) the founder of Action Research emphasised the main feature of Action Research is a focus on specific problem areas, followed by action to intervene in the problem area whilst relying on feed back mechanisms throughout the process (Alvesson and Skoldberg, 2002; Easterby, Smith and Malina, 1999; Whetton, 1989).

**Figure 2-1: The *'four moments'* of Action Research adapted from Carr and Kemmis (1986).**



### 2.1.2 SSM Soft Systems Methodology

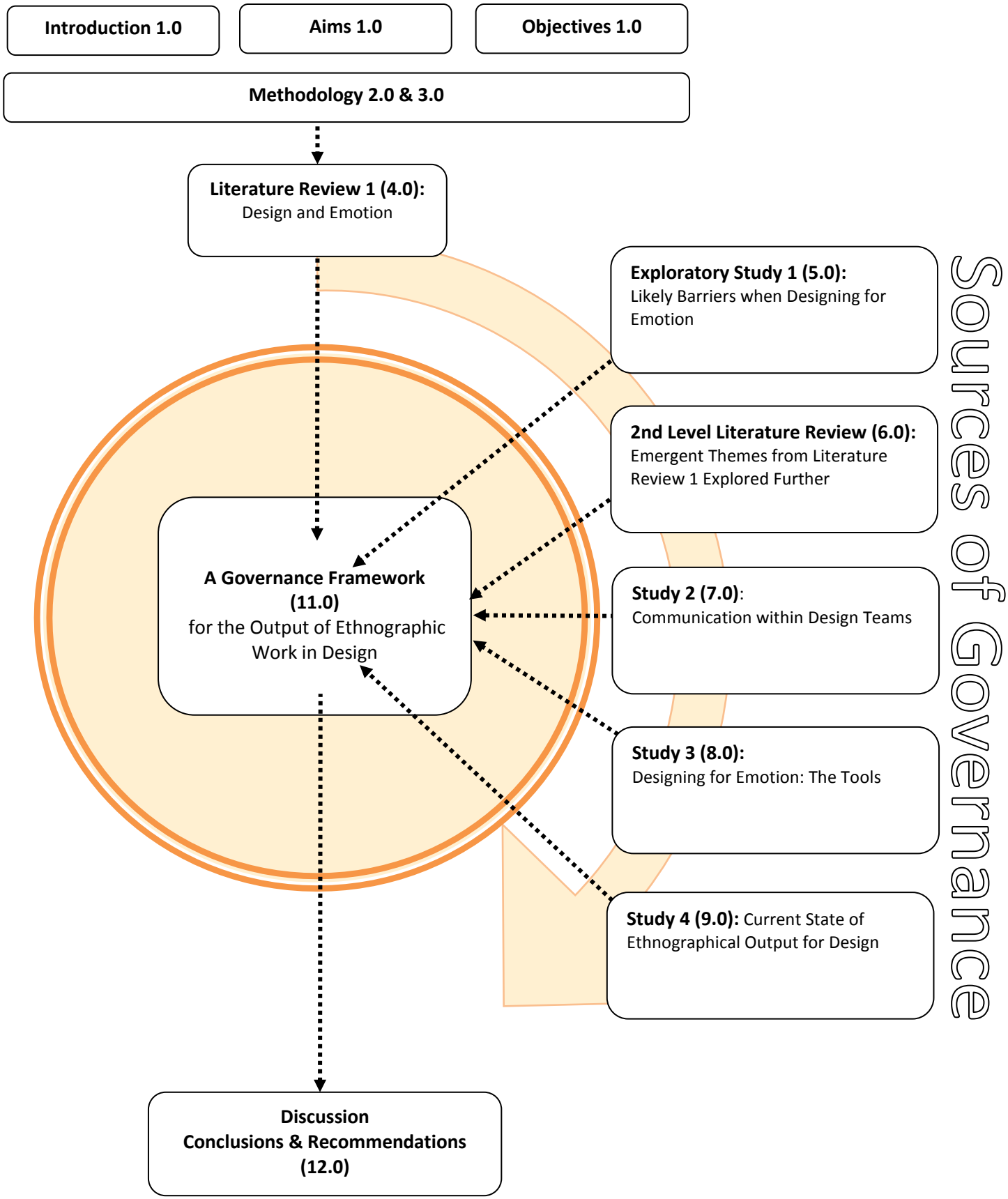
Action Research is grounded in theory to address both modalities of the research goals encouraging the generated theory to be readily tested and applied, accounting for both practitioner and academic approaches.

The very 'human' aspect of the research undertaken demanded an approach that allowed for dealing with much complexity, rich context and multiple sources for knowledge production.

Soft Systems Methodology (SSM) is a recommended approach for researchers working in an Action Research mode, particularly when the research project is complex, trandisciplinary in nature and draws from different sources of data as demonstrated by the content diagram, previously shown (figure 1-1). The research adopted a soft systems approach as the theoretical framework to encapsulate and guide the research programme.

The content diagram demonstrates the research logic within this PhD thesis and represents the systems approach, identifying the problem area and the multiple perspectives considered to then discuss the 'purposeful activity' (Checkland and Poulter, 2009) from all stakeholder perspectives. The content diagram demonstrates the time line, content, and the research logic as the drivers throughout this thesis.

**Figure 2-2: Content Diagram**



SSM works well within Action Research to provide, not only an understanding of complex systems, but also a way to identify opportunities for improvement and how those improvements might be implemented (Symon and Cassell 1998). SSM is an approach that can be made your own adopted and adapted for use where people seek to explore a problematical situation and take action to improve it. This PhD thesis is trandisciplinary in nature and addresses a perceived problematical area of human social complexity thus making this body of work an ideal activity for inclusion within a soft systems framework. SSM is a strategic approach to managing any ongoing human situation through understanding complex situations from multiple perspectives. This systematic approach offers rigour to the analysis of social situations and, in turn, a grounding for the theory to improve through action.

Checkland and Poulter (2009) offer the following four steps for the implementation of SSM, to which this research adheres:

1. Explore the perceived problematic situation producing a diagrammatic representation of the problem area referred to as a 'Rich Picture' [see content diagram. Figure 2-2].

2. Identify stakeholders [and the multiple perspectives offered by those stakeholders] by gaining an understanding of the purposeful activity carried out by the stakeholders within the problematic situation.

3. Discuss the purposeful activity from all stakeholder perspectives and the likely implication as a result of the proposed change.

4. Take action to change and improve the problematical situation.

### 2.1.3 Grounded Theory Analysis

This research makes a contribution to both fundamental and applied knowledge through the generation of theory grounded in the practice and literature of this PhD. In Grounded Theory what is happening is questioned and examined, this approach goes further by providing a proposal for what will happen if changes are made. Grounded Theory formed the basis of the research programme, a systematic approach to the generation of theory, within social research that extends beyond the provision of inductive hypothesised relationships between concepts (themes) towards a deductive approach that proposes concepts and properties derived from data to hypothesise what might happen when changes are made to the research subject. Grounded Theory further compliments Action Research, to explore a problematic situation and take action to improve it.

*"Developing theory is a complex activity. Theory denotes a set of well developed categories (themes) that are systematically interrelated through statements of relationship to form a theoretical framework that explains some phenomenon The cohesiveness of the theory occurs through the use of an over arching explanatory concept, one that stands above the rest. And that taken together with the other concepts, explains the what, how, when, where, and why of something"*

*(Hage, 1972 as cited in Corbin and Strauss, 2008).*

Rather than seeking to eliminate researchers opinion, although this opinion must be recognised as exactly that, it remains an important part of the analysis and it is recognised within Grounded Theory that the researcher's "feelings" of whether or not the findings fit with their experience after having been immersed in the data should be taken into account: For example, do the research findings match what the researcher believes the participants are trying to convey?

Concepts emerge through the coding (annotation) of components (constructs) and through their reappearance, properties (characteristics or traits) within the data emerge into themes referred to within Grounded Theory as concepts. Each of the properties within the concept can vary dimensionally. The presence of a particular property or combination of properties gives rise to the concept/theme and not the other way around. Although, over time, the researcher may start to think only in themes it is the properties of those themes that act as the mental cue for their discovery. In Grounded Theory properties not themes or concepts are sought: The themes look after themselves: this is arguably a common feature across all social research where the concepts are identified through their properties and components and the theme is an overarching title for the recurring components.

In Grounded Theory a microanalysis for each property is performed within the concept. This microanalysis is a form of 'open' coding i.e. in the microanalysis several possible meanings of a given component or property may emerge. In the microanalysis the concept is broken down (although the concept is yet to be outlined at this stage of the analysis) examining the specific words and phrases used within a concept, and the possible meanings that may be attributed. In the microanalysis a combination of words are looked for, but how these words are arranged determines how they are classified, or not, as a property of a particular theme/ concept. With this in mind, in the Grounded Theory analysis, the process works from the bottom up from component to concept or the observation of constructs in action and their classification into themes.

During the early exploratory stages of this PhD the themes emerged quite rapidly. The concepts within this PhD thesis that lead to the underlying theory can be deconstructed into a microanalysis of the components and thus validate what appeared as explicitly emergent themes.

In the purist form of Grounded Theory, coding would start by identifying single words, followed by a search for properties with multiple meaning for the 'true' meaning to be debated and agreed, followed closely by those that identify properties as having one meaning and those researchers that look for themes as a type of rapid Grounded Theory.

In Grounded Theory an approach is encouraged where analysis should take place during the initial stages of data collection as an iterative approach allowing concepts to emerge, thus recognising concepts early on in the research process to sensitise the researcher within the theoretical framework and maximise the insight to be drawn from the data; it should be noted that with reasonable timing this does not advocate forcing themes. This approach of gathering data based on the emergent concepts and themes is referred to as theoretical sampling. It can be said that the ideal approach would be to alternate analysis with data collection although understandably this is not always possible. (Glaser & Strauss, 1967; Strauss, 1987; as cited in Corbin and Strauss, 2008).

> *"Being immersed in data analysis during data collection provides a sense of direction, promotes greater sensitivity to data, and enables the researcher to redirect and revise interview questions or observations as he or she proceeds"* (Corbin and Strauss 2008).

Corbin and Strauss (2008) recognise that each researcher will have their own toolkit of strategies for analysis and these analytical tools or mental strategies can vary greatly.

In Grounded Theory the analysis results in an 'open coding' approach through annotation and scenario building, to determine the meaning of components; words, sentences and paragraphs. These components come together as properties or characteristics of the data and are coded/annotated within the data. Through the recognition that these properties are recurring, whilst they may vary in dimension i.e. magnitude, they emerge as concepts within the data or substance, thus generating a professional body of empirical knowledge for theory generation where concepts, as acquired knowledge, may be used to make inferences about the data as a whole.

In Corbin and Strauss (2008) a triangulated approach to social inquiry is encouraged and Grounded Theory is not an exception to this fundamental approach adopted within this PhD, but makes provision to maintain a flexible approach to the data collection which is not prescriptive but guiding.

## 2.2 Validity

Adapted from Trochim and Donelly (2007) a 'Validity Threat Matrix' was created [appendix A] as a tool to guide the research programme. The following four key validity questions were considered.

- Is there a relationship shown within the research programme? Or did something outside the programme cause the observed effects? (Conclusion Validity).

- What is the relationship e.g. causal? And was it caused within the research programme? (Internal Validity).

- Did you implement what you wanted to implement and did you measure what you wanted to measure and how did the way you observed the outcome effect the validity of the results? (Construct Validity).

- Does the outcome cross boundaries? I.e. can it be generalised**?** (External Validity).

The validity of research concerns the quality of the research, the conclusions and resulting contribution to knowledge. Validity is specifically related to the validity of the results. Questions and samples of measures are not usually discussed as having validity but should lead to valid results.

There are two aspects to the research; the theories and observations made by the researcher. Constant comparisons between what one expects to happen and what is perceived give rise to the four key validity types. Each of the validity types build on one another: Conclusion and Internal Validity relate to the observed world with Construct Validity connecting the theoretical to the empirical whilst External Validity resides among the emergent research theory.

This triangulated approach among sources/stakeholders and situations supported a valid conclusion to identify cross border themes from multiple sources. The conclusions have been consistently demonstrated and are bound within the scope of this research.

### 2.2.1 Conclusion Validity

A valid conclusion should demonstrate that there truly is a relationship shown within the observation. This relationship may or may not be a result of the research programme, for example, although there may be a positive relationship between two constructs they may be related independently from the changes within the research programme caused by an external factor other than the programme. Is there really a problem and do we believe there is a common cause? Furthermore, is that cause consistently demonstrated and bound within the scope of the research i.e. is this phenomenon a result of other forces acting outside the scope of the research programme that we may or may not have considered? The triangulated Grounded Theory approach adopted for this PhD thesis allowed themes to emerge rather than be imposed and thus avoided influencing the direction of the research programme, and in turn the validity of any conclusion, maintaining the naturally occurring relationships among the emergent concepts. These convergent perspectives as sources of governance are considered valid by the very nature of their interrelated perspectives from which the conclusions are drawn. In this research approach as many stakeholders as reasonably practicable were considered within the scope of the context under study. However, this is not to suggest that there may be other key perspectives or sources that may contribute further to the validity of these conclusions but that other non explicitly related influencing factors should be embraced as moving towards a more valid conclusion rather than avoided in the context of this PhD.

### 2.2.2 Internal Validity

Internal Validity relates to the type of relationship between the two constructs of the programme and identifies the type of relationship i.e. causality or correlation from within the research programme. The relationship between constructs may be presented as causal, however in such a research setting, the enormity of external influences in any social study make it near impossible to guarantee internal validity. The research approach adopted for this study sought to triangulate fallible realities towards an objective truth and thus towards what may be considered valid and evidently within the research programme.

### 2.2.3 Construct Validity

A valid construct is one that reflects the researcher's intention for the cause construct implementation and the measurement of the effect construct, i.e. in a case where the construct is successfully operationalised, is the researcher looking at what they intended to look at and how does the way they are looking at it affect the validity of results? The stakeholder's perspectives

can be considered as the operationalised cause constructs within this PhD thesis to generate an understanding of the area (design domain) to be affected. The selected constructs as part of a multisource triangulated approach are considered valid in their service to reflect the research intentions to gain multiple perspectives as to ascertain the opportunities for improvement when arranging and communicating ethnographic work for design teams. The Grounded Theory approach to conceptual coding and thorough annotation is considered as further support for the valid measurement of the likely outcome as a (critical) effect construct.

### 2.2.4 External Validity

External Validity is concerned with the generalisability of the research outcome across other groups, people, settings and time. The external generalisability is concerned, primarily, with the relevance of the research programme outside of the study. Internal generalisability refers to the belief that findings from the research programme can be recreated or will be relevant across settings similar to those of the study. The broad range of views shared across professional disciplines cross boundaries due to their very nature to adopt and adapt their working practice from one project to the next with direction from field based techniques, suggests a level of generalisability of this research to other field based research methods.

## 2.3 Participants and Sampling

The studies discussed within this thesis employ methods of non-probability sampling; sampling without using random selection methods. The aim was for the study population (accessible sources) and in turn the sample (the sources actually used in the study) to reflect as closely as possible the stakeholders from the theoretical population that would be the basis for generalisation. It was also of paramount importance to select a cross section of (human and non-human) stakeholders from the theoretical population for the study group to ensure their representation. Ordinarily, this representation may be lost by using other probability sampling methods for such a small population where ethnographers occupy a diverse range of specialist areas in addition to academic and practitioner groups.

The non-probability sampling approach facilitated the research in gaining insight from participants selected for their expert opinion; *Expert Sampling* and their role; *Purposive Sampling*.

When using randomised sampling for the smaller and more diverse theoretical populations, there is a greater risk of actually not representing a good sample from the theoretical population at risk

of not representing all stakeholders or participants. This is comparable to the analogy of stepping stones in a stream the fewer stones there are the more non-probabilistic you want to be.

## 2.4 Ethical consideration

The research within this thesis relies upon a system of ethical standards for applied social research created to protect the rights of research participants. These ethical standards comprise

- Voluntary Participation
- Informed Consent
- Risk of Harm
- Confidentiality
- Right to Service

The sample groups were not coerced, they voluntarily participated, they were informed about the research programme associated risks and procedures and were not put at risk of either physical or psychological harm. Personal identifying information was not made available outside of the research programme to individuals or organisations not directly involved in the study. The research programme offered equal access to the beneficial experience of the study for all participants supporting the participants' rights to equal access.

## 3.0 Methodological Stance & Philosophical Assumptions

As a theory of how things are done, the research methodology is taken to refer not only to the process and practice behind the research activity, but also the ontological stance of the research design. These underlying philosophical assumptions, beliefs and attitudes considerably influence the discovery of knowledge and are discussed here.

Much of the selected research strategy within this PhD thesis was selected because the methods are appropriate for generating knowledge grounded in data. The research strategy shares the axioms behind Strauss and Glaser's philosophy; a Grounded Theory. The following underpinning assumptions have been quoted and then summarised in relation to this PhD.

## 3.1 Philosophical Assumptions

> *"The external world is a symbolic representation, a 'symbolic universe' Both this* (the external symbolic world is not the universal truth) *and the interior worlds are created and recreated through interaction. In effect there is no divide between external or interior world"*
> *(Blumer 1969).*

The internal meaning of a symbolic external world is treated as an irreducible truth that manifests meaning for each individual observer. Whilst the object of the symbolic representation can be reduced to its materials, geometry and other denominations, to what may then be regarded as a universal truth, the research epistemology is essentially an anti-reductionist phenomenology (observations of conscious experience) concerned with the internal meaning of these symbols that form the internal world of the observer and the symbolic representation: A metaphysical truth.

On the basis that 'interior' conscious experience and 'external' symbolic worlds are adaptive through interaction, the internal perspective of the conscious observer is then grounded within a metaphysical truth (external world) or, more appropriately termed, reality. This supports a post empiricist critical realist philosophy; where a unique 'symbolic' reality may exist for every individual, underpinned by the meaning assigned by the observer to their surroundings as a symbolic representation of an objective truth. This research philosophy considers that only the metaphysical truth of the world is knowingly accessible. The objective truth is considered accessible, if only intermittently, and not necessarily recognisable as such. These symbols (the external world) remain a fallible sociocultural construct. If a single universal truth exists it is unlikely to be fully recognised on the basis that it can only ever be interpreted, understood and represented as a product of the observer's previous experiences and understanding of the world. It appears that any symbolic interactionist philosophy is a barrier to gaining access to a universal truth. A contradiction in terms for the critical realist that considers a universal truth as accessible although accounted for by the caveat that all observation is fallible. This ontological standpoint, a symbolic interactionist critical realist epistemology, demands a triangulated approach and the consideration of multiple perspectives for knowledge acquisition.

> *Meanings (assigned to symbols) are aspects of interaction, and are related to others within systems of meanings (symbols). Interactions generate new meanings… as well as alter and maintain old ones*
> *(Mead, 1934).*

An individual's experiential learning results in the inevitable honing of their world view and to truly understand action/interaction, the observer must first understand, not just the short sighted causality, but the historical foundations behind the interactants view and thus the rationality behind their actions.

> *"Actions are embedded in interactions, past, present and imagined future. Thus, actions also carry meanings and are locatable within systems of meanings. Actions may generate further meanings both with regards to further actions and the interactions in which they are embedded"*
> *(Mead, 1934).*

These systems of meanings are based on who we are, who we think we are, who we would like to be, our values, aspirations, needs and life experiences. The meaning assigned to symbols as part of an individual's ongoing quest to understand the world around them is constantly evolving with each interaction.

> *"Contingencies are likely to arise during a course of action. These can bring about change in its duration, pace, and even intent, which may alter the structure and process of interaction"*
> *(Dewey, 1929).*

Although a particular action may construct a particular reality, the meaning and value systems between interactants will need to be shared, negotiated and understood for correct interpretation. These actions may be misconstrued taking the interaction in quite a different direction if the miscommunication goes unnoticed. These contingencies are scenarios or possible directions for the interaction.

> *"Actions are accompanied by temporality, for they constitute courses of action of varying duration. Various actors' interpretations of the temporal aspects of an action may differ according to the actors' respective perspectives; these interpretations may also change as the action proceeds"*
> *(Mead, 1959).*

Any action is subjected to a spatiotemporal sensitivity; a context of time and place that may yield different meanings when the symbolic interaction is viewed in isolation.

> *"Courses of interaction arise out of shared perspectives, and when not shared, if action /interaction is to proceed, perspectives must be negotiated"*
> *(Blumer, 1969).*

If interaction is to proceed, the negotiation of perspectives is not only a prerequisite for interaction but a prerequisite for alignment within the context of the interaction. This very approach is the foundation of many forced morphological creative thinking techniques, that disrupt sequential thinking, prove very successful as a method of interaction.

*"During early childhood and continuing all through life, humans develop selves that enter into virtually all their actions and in a variety of ways"*
*(Mead 1959).*

*"Actions (overt and covert) may be preceded, accompanied, and/or succeeded by reflexive interactions (feeding back onto each other). These actions may be one's own or those of other actors. Especially important is that in many actions the future is included in the actions"*
*(Dewey, 1929).*

The appraisal of future within action is fundamental to human nature appraising a particular situation object, group or individual as either harmful or beneficial for future goals and survival.

*"Interactions may be followed by reviews of actions, one's own and those of others, as well as projections of future ones. The reviews and evaluations made along the action/ interaction course may affect a partial or even complete recasting of it"*
*(Dewey, 1929).*

*"Actions are not necessarily rational. Many are nonrational or, in common parlance, 'irrational' yet rational actions can be mistakenly perceived as not so by other actors"*
*(Dewey, 1929).*

*"Action has emotional aspects: To conceive of emotion as distinguishable from action, as entities accompanying action, is to reify those aspects of action. For us, there is no dualism. One can't separate emotion from action; they are part of the same flow of events, one leading into the other"*
*(Dewey, 1929).*

*"Means-ends analytic schemes are usually not appropriate to understanding action and interaction these commonsense and unexamined social science schemes are much too simple for interpreting human conduct"*
*(Strauss, 1993).*

*"The embeddedness in interaction of an action implies an intersection of actions. The intersection entails possible or even probable, differences among the perspectives of actors (Strauss, 1993).*

*The several or many participants in an interactional course necessitate the alignment (or articulation) of their respective actions (Blumer, 1969).*

*"A major set of conditions for actors' perspectives, and thus their interactions, is their membership in social worlds and subworlds. In contemporary societies, these memberships are often complex, overlapping, contrasting, conflicting and not always apparent to other interactants" (Strauss, 1993).*

*"A useful fundamental distinction between classes or interactions is between the routine and the problematic. Problematic interactions involve "thought," or when more than one interactant is involved then also "discussion." An important aspect of problematic action can also be "debate" – disagreement over issues or their resolution. That is, an arena has been formed that will affect the future course of action" (Dewey, 1929; Strauss, 1993).*

## 3.2 Methodological implications

Any methodology designed to facilitate the understanding of the complexity of multiple stakeholders tends towards a complexity of its own. The basis of analyses can however be formed on process. Whilst it is impractical to fully capture the complexity that comes with acquiring and interpreting other's perspectives, none the less, a representation of these world-views may be given through the acquisition of multiple stakeholders perspectives on how best to improve the output of ethnographically inspired methods in design. These factors highlight the suitability of a soft systems methodology.

Throughout the research project, concepts (themes) at various levels of abstraction, become the basis for analysis and without these concepts it is difficult if not impossible to discuss the complex phenomena in a meaningful way. The research methodology does not intend to reduce the understanding of action/interaction/emotion to a single systematic process but is designed to provide various concepts of abstraction to form a basis of analysis and discussion. Without a common language there can be no discussion. Searching for a universal truth and the world views held against that truth have been the guiding force and triangulation for the governance framework. The best that can be expected is to collect multiple perspectives and triangulate these fallible realities towards an objective truth.

This PhD thesis resides within the exploration and study of the social world, where the design of the research strategy and understanding of knowledge acquisition are based on a post positivist critical realist philosophy, holding an epistemology of relativist, constructive, symbolic interactionism, promoting the uptake of a research methodology comprising those of Grounded Theory, Action Research, Soft Systems Methodology and Ethnography. These comprise of but shall not be limited to, case study research, focus groups, interview questionnaires and theoretical sampling.

## 4.0 Exploring the Domain

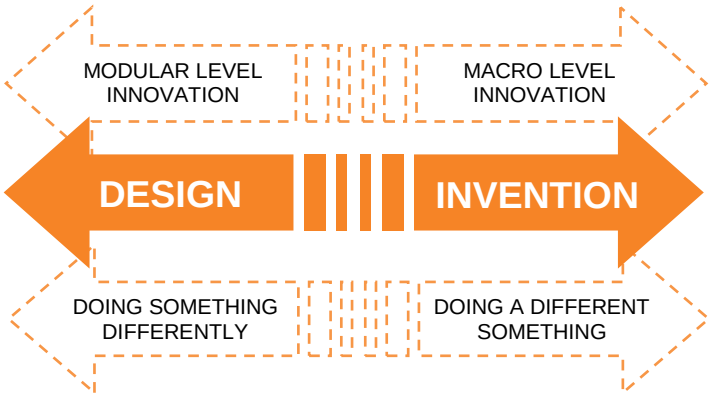
## 4.1 The Design Process

The design process has been discussed and represented in many different ways, with no single working model providing a universally accepted description of the design process. This is largely due to changing market conditions, evolving consumer preferences and the role for design in industry. The representation of the design process (fig1-2 pp. 19) within this research adheres to the practitioner view held by the author, which does not dramatically deviate from the milieu of other proposals, yet remains close to the communication led perspective of design work presented within this research programme.

From a top level perspective most would agree that the design process is the intentional activity of creating what never was. When a more detailed and domain specific process is considered, many variations along a theme begin to appear. A series of intentional, iterative steps working towards the common goal of intentional change in a sustainable manner, largely defines the design process discussed within this paper. The common goal is ordinarily to develop a product system or service that responds to a set of needs or expectations.

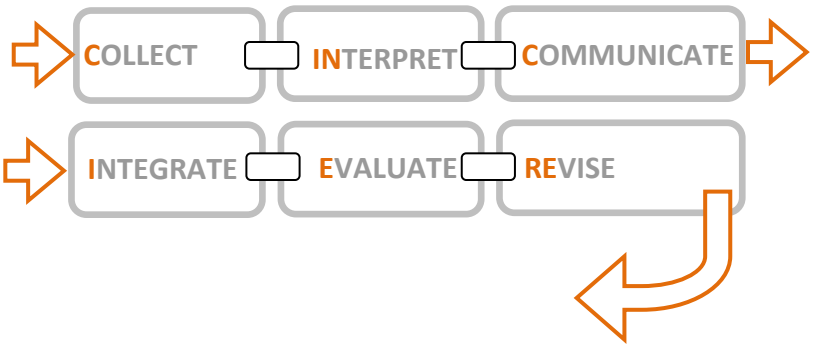
Design is generally doing something differently whilst invention is doing a different something, with the magnitude of innovation used to describe both activities, which can be measured in terms of the micro to macro level contribution from component to concept and the implications of these innovations on life and the wider environment. Innovation in the context of this PhD thesis is understood as the application and outcome of design work and invention: Please see diagrammatical representation shown overleaf (figure 4-1). Examples of macro innovation would include for example the television, the telephone, and the light bulb. Modular level innovation would include for example colour television, and cordless in house telephones.

**Figure 4-1: Proposed Model of Design Innovation**




The general view presented within this thesis is that good communication is fundamental to successful design when seeking to produce commercial products, systems or services. Communication as identified within the work based case study can be considered the blood line within the design process. It is reasonable to view the design process from that perspective; one of communication flow, which in turn, supported by the literature, guides this study towards the exploration of how ethnographic work might be arranged and communicated throughout the design process. A proposed communication led view of the design process is shown below, (figure 4-2) where the successful incorporation of ethnographic work in design practice will influence each of these stages.

**Figure 4-2: Proposed CINCIERE Design Model:**



## 4.2 The Origins of Design and Emotion

Human emotion has been an integral part of product design long before any explicit recognition within the design domain (Overbeeke, Hekkert 1999; Demir, 2008), taking its place alongside practical utility, usability and sustainability. ‘Design and Emotion’ emerged as a recognisable field of study in the late 1990s marked by the first conference on ‘Design and Emotion’ at Delft University of Technology. ‘Design and Emotion’ evolved, and continues to do so, within the expansion of Design Research and Design Methods recognised during the 1960s as a path to better understand the process of designing for ongoing development.

Design and Emotion emerged in its current form during the same period as Pine and Gilmore’s 1999 book ‘The Experience Economy’ discussed below in 4.2.1 The design and emotion movement does not compromise the basis of good design, expressed by Pine and Gilmore (1999), as the supporting economies. Examples such as product function and usability are a platform upon which to build positive pre and post consumption experiences.

### 4.2.1 The Experience Economy

The experience economy presents itself as the fourth progression of economic value. Pine and Gilmore (1999) refer to this economy as being realised through experiential design. Although the value added function of experiential design has always existed, the conscious activity of separating these experiences from service is presented as a new one.

Experiential design focuses on the emotional and sensorial relationship between consumer and brand, seeking to engage consumers in a more personal way. In the ‘experience economy’ the value created through experiential design was recognised, offering a unique form of differentiation where all prior economic offerings primarily focused on the more direct functional aspects of design.

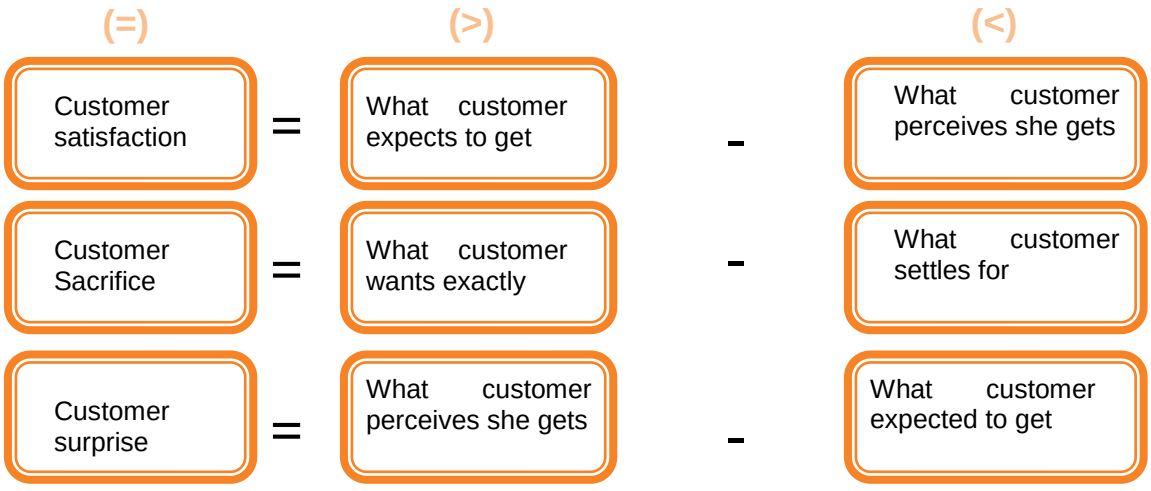
Pine and Gilmore (1999) encourage companies to use their services as a stage and their goods as an outstretched hand to touch and engage with the individual. Pine and Gilmore go on to say that commodities are fungible, goods tangible and services intangible, experiences are and must remain memorable. Pine and Gilmore (1999) urge companies to do more than a series of focus groups, questionnaires or surveys, often designed to ease tabulation rather than unearth true insight. To engage individuals in a more personal way you must truly understand who you are seeking to engage.

There is a fine distinction between measuring what a customer needs, versus the measurement of the consumer's preconditioned expectations of how a brand will behave. Understanding the difference between customer needs and what customers accept is to understand customer sacrifice (Pine and Gilmore, 1999)

Pine and Gilmore (1999), talk about staging customer surprise by exploiting the gap between what a customer expects to get and what a customer gets to perceive (see figure 4-3 below). Customer surprise is seen as the single most important ingredient for a memorable experience. The gap between true customer expectations (both the conscious and unconscious needs) and what the customer perceives provides a greater opportunity to maximise the level of surprise and depth of consumer relationship.

It is important to recognise that consumer pleasure is concerned with the totality of the consumer to product relationship. The sensorialised product functions as a proxy for those memorable experiences, in and out of the retail space, and functions as a generator of new experiences. The ongoing relationship will be built on the foundation of superior product functionality and usability as a platform to then attend to consumers' needs beyond the functional along both a known and unknown axis of competition.

**Figure 4-3 Model of 'Customer Sacrifice' adapted from Pine and Gilmore (1999)**



### 4.2.2 What is Designing for Emotion?

Designing for emotion is about designing for attachment through delight, exceeding expectations at every level from functionality to usability, sustainability to pleasure. Consumer values, aspirations, their sociocultural norms, and their frame of mind when observing or using a particular product, remain the most implicit and challenging to embody. The collection, interpretation and communication of consumer research to the design practitioner remain key challenges for the Design and Emotion movement.

Products can evoke pleasure, which may be joy, happiness, hope, satisfaction, pride, admiration, liking, gratitude, gratification, love. (Ortony, et al, 1988) These emotion types can be facilitated by understanding and designing products that consumers and users can relate to. These emotions result from understanding and projecting aspirations and values onto a product that consumers want to be associated with.

It may be that a focus on the more functional aspects of a design will have a greater affect on the pleasure experienced by consumers' pre and post purchase where the apparently hedonic concerns of a consumer may not appear to directly influence the purchase of, for example, a soldering iron. Based on the notion that the product, however, fits an image of durability and technological success may play an important role in the purchase decision and pleasure derived through use and display of such devices in a laboratory as leading edge and professional.

### 4.2.3 What is Meant by Consumer Pleasure?

Jordan (2000) emphasises the marginal competitive advantage offered by functionality, reliability and manufacturing costs alone. Where functionality and usability have moved from being called satisfiers to dissatisfiers. Jordan (2000) promotes an approach founded upon concepts of pleasure as a basis for design, encouraging designers to take holistic user perspectives making stronger connections between people and products defining pleasure within product design as "the emotional (values, aspirations, sociocultural norms and mood) hedonic (sensorial) and practical (empowerment) benefits associated with products". The practical benefits arise from the outcomes of tasks performed by the product which can be expressed as enablers or empowerment for the user.

Further emphasis is placed on the need to understand the end user as part of the product and its development; it is the interaction and relationship between the person and the product that brings pleasure not the product alone. The emotional benefits are those that influence a person's mood

related to their values and aspirations inclusive of any sociocultural norms they seek to fit whilst the hedonic benefits are related more closely to sensory and aesthetic pleasures associated with products.

Jordan (1999) takes his lead from Canadian Anthropologist Lionel Tiger (1992) who has extensively studied and developed a framework to better understand pleasure and how we experience pleasure within four distinct types; physiological, sociological, psychological and ideological. Jordan (1999) offers these four types as a design framework to be considered when developing pleasurable products.

Designing for emotion is about addressing not only the obviously emotionally associated needs but also the practical and hedonic needs. Tiger's four pleasures address most of the needs a user might have when interacting with a product. Meeting these needs and where possible, exceeding them is central to consumer delight, purchase and attachment to the product.

Physiological pleasure is derived from the senses, including touch, taste, and smell as well as feelings of sensual pleasure. Physio pleasure can refer to the tactile qualities of a product the feedback through use and the collective experience from smell, warmth, comfort and other sensations.

Sociological pleasure is the enjoyment from the relationships we have with others and also our relationship with society as a wider network. Socio pleasure is about making connections, sociocultural norms reside within this pleasure type. The socio pleasure may arise not only in owning or using the product in isolation but how we use it to facilitate our interactions with others to form part of our social identity.

Psychological pleasure relates to the cognitive and emotional reactions when interacting and experiencing the product and how we reach a state of emotional well being and delight. Pleasure may be derived by the ease of cognitive processing during use and the empowerment of efficiency to perform a task more effectively.

The ideological pleasure type includes a person's values, aspirations, who they are and who they want to be, embodied within the aesthetics of a product and the meaning it communicates through form, materials and application.

### 4.2.4 Does it Really Work?

Products carry meaning at an emotional level: References to emotion are made specifically to the pleasure arising through use and ownership and each user or consumer will have their own memories and experiences which give meaning to a particular product (Douglas and Isherwood, 1979). If that meaning reflects the symmetry between a product's meaning and its direct reflection of our aspirations, values and sociocultural templates or norms (Miles, 1998) it is likely the potential for delight and loyalty will increase.

Emotions are central to human behaviour and the decisions we make. Damasio (2000) presents a very clear view as to the extent that emotions run through the everyday lives of people.

> *"Without exception men and women of all ages , of all cultures, of all levels of education and of all walks of economic life have emotions, are mindful of the emotions of others, cultivate pastimes that manipulate their emotions and govern their lives in no small part by the pursuit of one emotion, happiness and the avoidance of unpleasant emotions"*
>
> (Damasio, 2000, p.35 as cited in Hekkert and McDonagh, 2003).

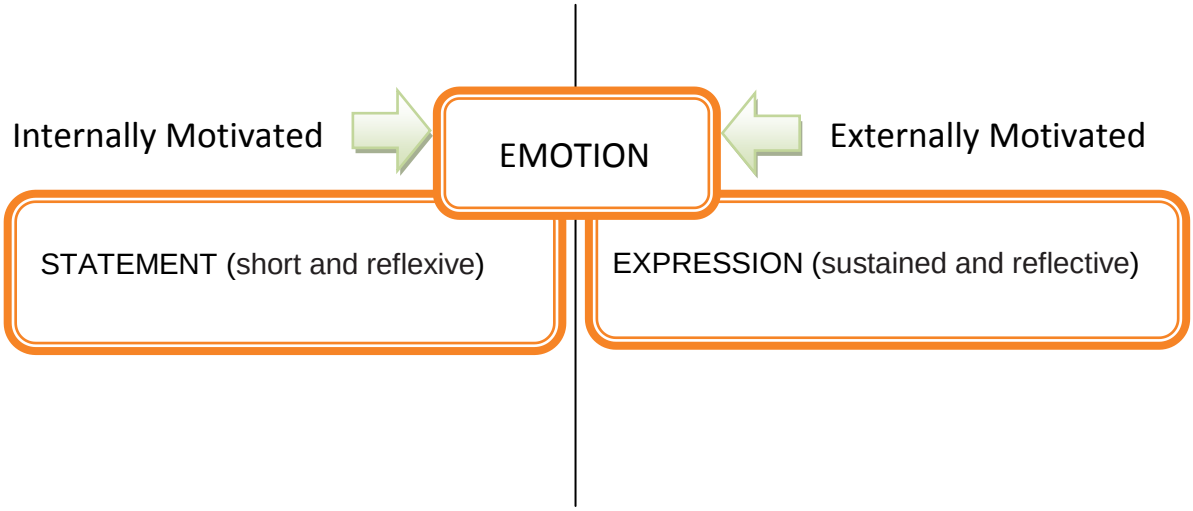
The majority of consumers view brand association and product purchase as an extension of oneself (Aaker, 1996; Kuksov, 2004) relating to, and communicating through, the non-verbal signals of a particular brand. As consumers continue to base purchasing decisions on products that satisfy their emotional needs, consumer product and service development companies seek to differentiate themselves and their products with a thorough understanding of how they might respond to these concerns.

### 4.2.5 Human Emotion: A Foundation for Design.

Emotion is a neural impulse that moves an organism either towards or away from a particular condition appraised as harmful of beneficial for survival (Arnold, 1960; Frijda, 1986; Rolls, 2002; Ortony, Clore and Collins, 1998).

As a 'quality' of experience, emotion (figure 4-4) can be divided into expressions and statements (Dewey, 1971 as cited in Forlizzi, Disalvo and Hannington, 2003) serving an adaptive function to establish an individual's position relative to their environment, causing an individual to move towards or migrate away from people, objects and ideas (Frijda, 1986). Whilst people vary with respect to their individual emotional responses, the processes that precede these responses are considered universal.

**Figure 4-4: Diagrammatic representation of human emotion as statements and expressions**




Emotion can be divided into statements, as internal physiological motivations such as when a child cries due to hunger. Expressions are a longer lasting experience, externally influenced by the surrounding environment which offers cues to extend an experience or to evoke a new experience or remind people of previous experiences. These modes of experience are termed respectively as extenders, stimulators and proxies for new and existing experiences, leading towards the emotional expression (Csikszentmihalyi, 1993).

The position held within this thesis is that the collective human experience may be partially influenced by the designed artefact or environment in which the consumer resides pre/post consumption, during and after use. Expressions (emotion) and Statements (motivation) are based

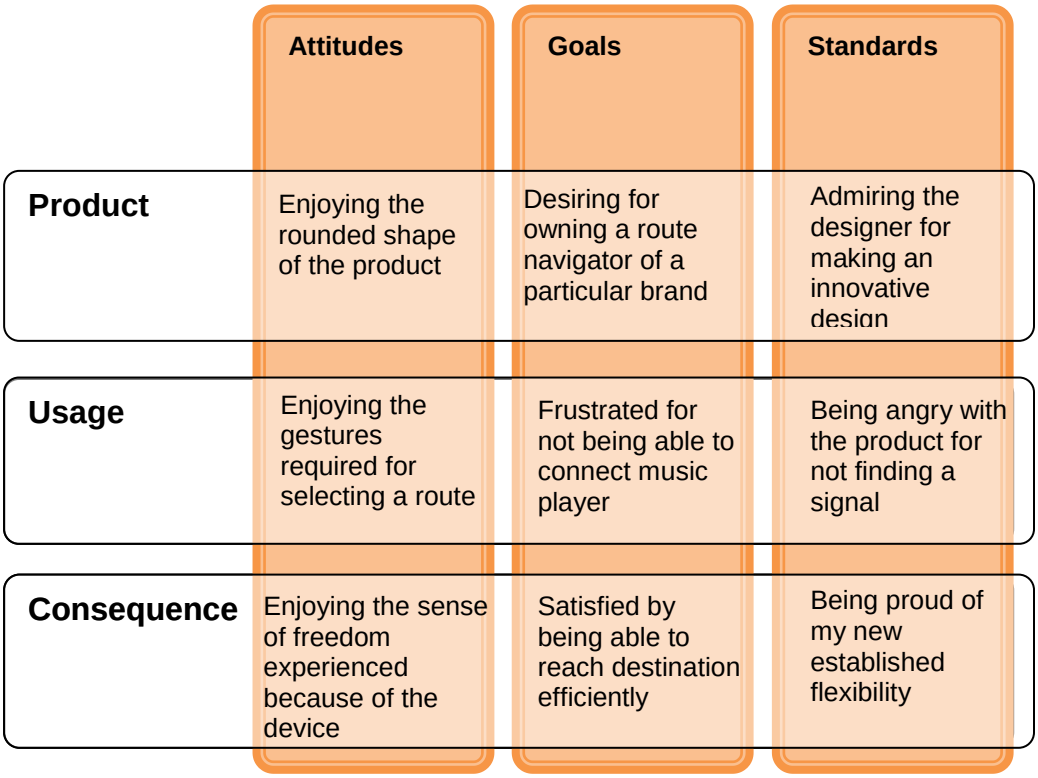
on a common rewards and punishment scheme where individual behaviour is influenced through the attempt to either avoid punishment or attain reward (Rolls 2002).

Emotional rewards or punishment have been discussed in terms of consumer and user expectations (Desmet and Hekkert, 2007) it is the collection and clear communication of these expectations that are fundamental to new product development within the design and emotion movement.

The human environment invariably consists of both natural and designed artefacts, systems and services all subject to human interaction, which affect expression. It is considered within this PhD thesis and the wider literature that these environments and in turn the consumer experience are well within the reach of the design profession to adjust alter and influence. (Forlizzi, DiSalvo and Hanington, 2003).

Desmet and Hekkert (2002) support the belief that a universal process underlies all emotional responses to consumer products. Desmet (2007) offers nine sources of product evoked emotions (figure 4-5) which arise from a common pattern of eliciting conditions (Desmet and Hekkert, 2002).

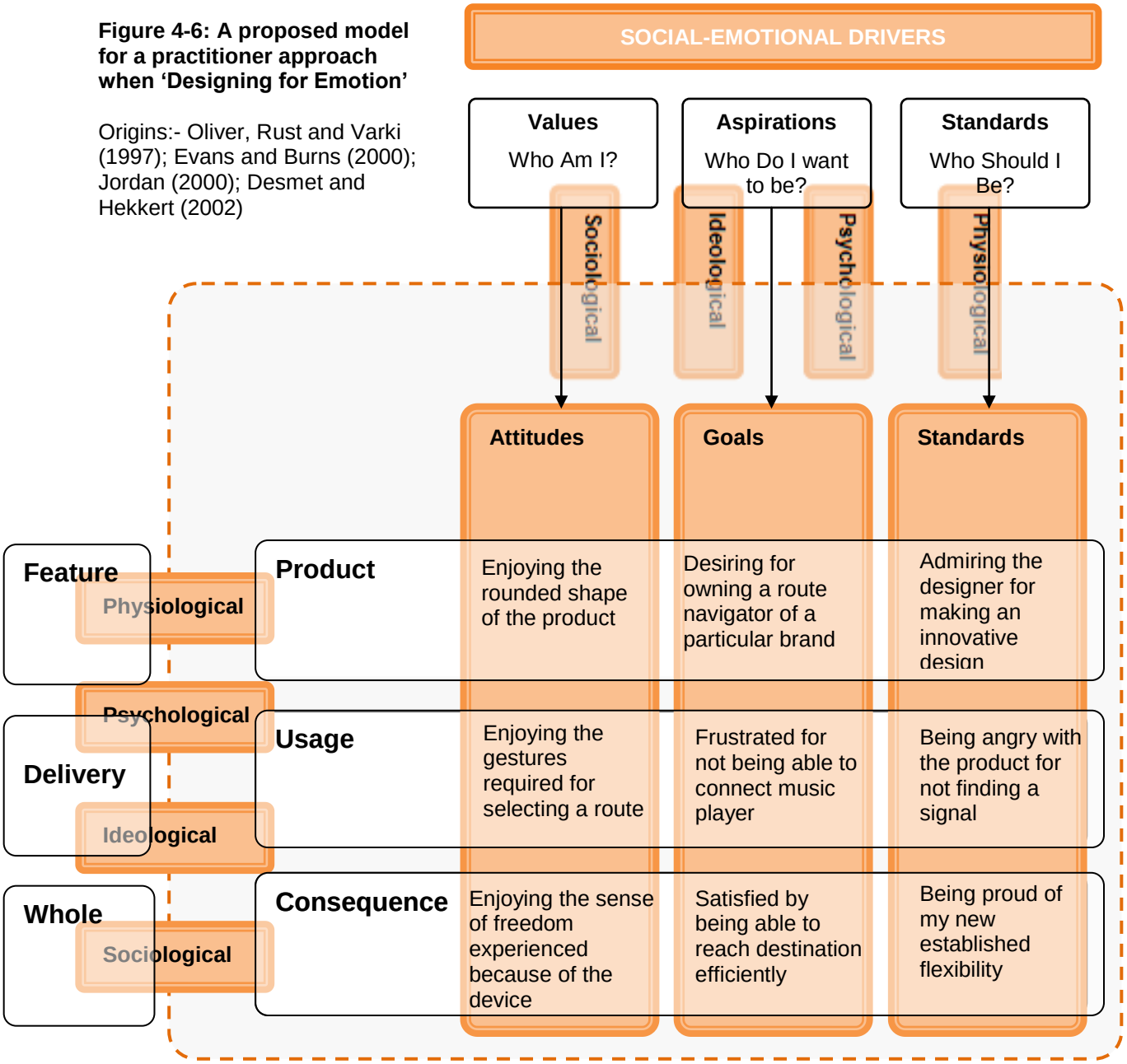
**Figure 4-5: Framework of nine sources of product emotion**



Please see the figure below (figure 4-5) in reference to the evaluation of a satellite navigation product generated by a cross over between the stimuli and the concerns held by a consumer.

**Figure 4-6: A proposed model for a practitioner approach when 'Designing for Emotion'**

Origins:- Oliver, Rust and Varki (1997); Evans and Burns (2000); Jordan (2000); Desmet and Hekkert (2002)




It is considered that a person's general experience of well being is a product of their day to day emotions (Diener and Lucas, 2000) and the vast majority of these of these emotional responses are induced by the products in the human environment (Oatley and Duncan, 1992). These emotional responses can be seen to guide preferences and purchasing decisions, the pleasure and attachment experienced through use and ownership of a particular product.

Desmet and Hekkert (2002) believe these emotions are not as intangible as they seem and present the view that whilst emotions are personal and unique to the individual, the conditions that underlie and elicit them are universal. Desmet and Hekkert (2002) outline a cognitive basis of product emotions to explain the broad emotion types as a response to different products, and, to explain the personal differing emotions to the same product from one person to the next, with a consideration to the compound character; multiple emotions from a combination of aesthetics, function, brand, behaviour and associated meanings of product emotions.

The models of product emotions that represent this underlying process include four main parameters. (1) appraisal, (2), concern, (3) product, and (4) emotion (figure 4-6). Interplay among the first three determines the emotion 4. The emotion may then fall into either a broad personal or compound type (Desmet and Hekkert 2002).

Cognitive theorists including Roseman and Smith (2001) believe that a felt emotion always follows an automatic appraisal of a stimulus internally or externally motivated. (Rolls, 2002; Arnold, 1960; Forlizzi, Hannington, Disalvo, 2000; Frijda, 1986) claiming it is the meaning the individual attaches to the event not the event itself that is responsible for the felt emotion.

Each appraisal compares the stimulus (in this case the product) to a set of concerns or needs for the individual. In this case the appraisal has three possible outcomes; harmful, beneficial or not. The match or mismatch of stimuli to concerns will either attract or repel the individual. Types of concerns that individuals might have include drives, needs, instincts, motives, goals and values. (Scherer, 2001). Some of these concerns are general i.e love and safety whilst others are context specific such as getting home before it rains.

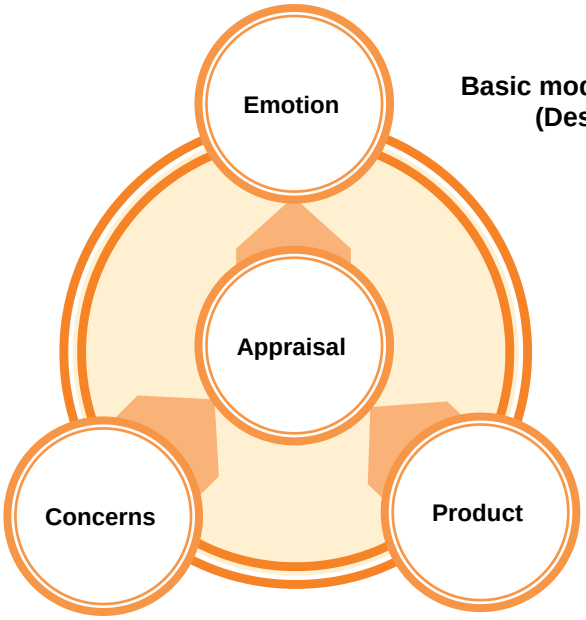



**Figure 4-7**
**Basic model of product emotions (Desmet and Hekkert 2003).**

Desmet, Hekkert and Hillen (2004) confirm a relationship between emotions evoked by consumer products and consumers underlying concerns. Figure 4-7, the basic model of product emotions (Desmet and Hekkert 2002) places a focus only on emotion not moods. These words are often used interchangeably; however, they refer to specific and different experiential phenomena.

Moods tend to outlast emotions (Ekman, 1994) whilst emotions exist only for short periods of time. Emotions are intentional whilst moods are non intentional, for example, emotions are aimed at a specific stimuli whilst moods result from our surroundings in general and have combined causes (Frijda, 1994). It is generally more difficult to specify the causes of a particular mood and the model focuses on the relationship between products and emotions where it is believed that the influence of moods on emotional responses to products are often independent to the product characteristics. Product characteristics can of course contribute to a mood and inevitably moods or an individual's frame of mind, when interacting with a product can also influence that experience (Ekman 1994) Never the less, it is important to remember that a person's emotional response to a product may vary depending on their mood (Faber and Christenson 1996). Particular types of emotion can be associated with particular types of appraisals generated by a cross over between the stimuli and the concerns held by a consumer. when a stimuli meets one of the needs or desires within the appraisal categories of attitudes, goals or standards, Desmet (2003) explains that emotion type can then be predicted and cites Lazarus (2001) and Roseman and Smith (2001) as supporting this claim. Depending on the concern 'type', the emotion can be categorised into either instrumental, aesthetic, social, surprise, and interest emotions. This classification is founded upon cognitive models of emotion developed by psychologists including Scherer (2001), Smith and Ellsworth (1987), Roseman (2001) and Ortony, Clore and Collins (1988).

Forlizzi, DiSalvo and Hanington (2003) emphasised that there is a lack of shared understanding of emotion within the context of design and how to approach and consider emotion during new product development. It has been recognised that emotions shape our experience of the world and that experience relies on more than any one single emotion from any one stimuli (Dewey, 1934). No single feature or attribute such as shape, material and colour elicit a specific emotional response. It is again the values, aspirations, socio-cultural norms, mood and context of use that form the wider picture of one's emotional experience. Dewey (1971), Carlson (1997) and Csikszentmihalyi (1993) encourage a greater understanding of the environment in which the emotional experience takes place and, furthermore, the levers that facilitate such an experience.

Forlizzi, DiSalvo, and Hanington (2003) emphasise that a better understanding of the qualities that matter to people will enhance their experiences, calling for designers to demonstrate a

greater awareness of peoples goals, aspirations, rituals and values. Personal, social, cultural and ecological contexts are four sources from which the relevant insight may be identified to design for emotion. These sources align themselves as accessible through ethnographic work, accompanied by a call from Forlizzi, DiSalvo, and Hanington (2003) to develop communication tools for designers to make these discoveries themselves through direct experience.

- Learning from data
- Look at the context and the people within
- Involve others and ask them to participate
- Self participation

## 4.3 What is Applied Ethnography?

Ethnography is the observation and reporting of people's behaviour/activity in the context of their beliefs, norms values and aspirations (Hughes et al. 1992) which may be used to seek to understand the communities culture and the underlying logic of their social practice to inform design. These behavioural drivers are understood in terms of the micro and macro level system interplay between human and non human stakeholders, from external (etic) and experiential (emic) perspectives and categorised concepts.

This contextual, rich and reflexive inquiry demands that ethnographic work be triangulated through observation, dialogue and participation to not only observe what members of the culture do, but to also gather insight as to what they might experience. Much of what people do is socially and emotionally driven; subjects can be understood in terms of the interplay between other subjects within the community, the ethnographer and social setting. Observations and reports may be sorted into thematic or chronological arrangements, concepts, coded and indexed.

As commonly used within the design profession, ethnographic inquiry without the later analytical component and exploration of system interplay is considered as merely 'scenic', lacking the analytical function used to reveal the conceptual organization of cultural settings. See Dourish and Forsythe (1989) and Button (2000).

The 'Applied' as proposed within this PhD thesis extends beyond traditional ethnography into mapping the content of ethnographic work into a format for design action; to facilitate critical appraisal of the people and context under study. The findings may present a before and after scenario for the context under study, extended further towards the provision of implications for design and further still into a type of 'Action Ethnography' comprising both analytical and critical

components for the context and people being studied. For example, what is the current state of a particular context and how might the context and the individuals within that context respond to change; what might the new setting look like.

Ethnography is of a relativist, critical-realist philosophy with a symbolic interactionist view of the world, in opposition to realism or positivism. Whilst there may be a single objective truth it is unlikely that truth can be reasonably and knowingly accessed. Truth remains relative to a particular frame of reference (relativism). The philosophical foundations behind ethnographic work demand that epistemological discipline distinguishes between knowledge and assumptions.

> *"Ethnographers do not choose their data or attempt to predict what their findings will be. Instead they allow key issues to emerge as the study progresses" …" it does not begin with a hypothesis that needs testing"*
>
> *(Rosenberg, 2000)*

### 4.3.1 Dourish

The seminal views brought together by Paul Dourish (2006) in his paper 'implications for design' offer a strong foundation to understand ethnographic work and how the current state of ethnographic output in design might be developed.

Dourish talks about Power Relations, Technology and Practice, the Marginalisation of Theory and Representation and Interaction as key opportunities to improve the application and output of ethnographic work in design.

#### 4.3.1.1 Power relations between disciplines

It is typical that throughout any given design process there will be a series of links and handovers between disciplines from the initial opportunity, investigation, generation, synthesis, manufacture, evaluation, use, re-use and disposal. The argument Dourish (2006) makes is that current textual documents comprising a list of implications for design are not only inadequate but are an abrupt handover between the ethnographic disciplines to the design team and that the ethnographical inquiry and more typical processes of design should be one and the same, particularly if one considers that creativity resides more often in the way that we find problems not in the how we solve them.

The power relations argument seeks to blur the boundaries between ethnographer and designer to not only resist ethnographic work from becoming subservient to design but to be an intrinsic

part of the design process, a source of ongoing reference and inquiry. The power relations argument is not reserved for the ethnographer to designer relationship but to avoid also, the transformation of consumers into passive actors, encouraging a participatory approach for both design and ethnographic work.

#### 4.3.1.2 The relationship between technology and practice

Dourish examines the relationship between technology implementation and practice, where a list of implications for design are not a sufficient means to represent the ethnographic work as the link between the everyday life under study and critical design, how the culture or community under study might be affected as a result of the new technology being introduced. One future challenge, beyond the consideration of the impact new technology may have on a community, is the extent of the boundary definition for that culture or community. Themes of particular interest to design would be useful when considering the wider scope and system interplay of the setting under observation so as to not overload the designer with details beyond the necessary scope of the design influence.

Ackerman (2000) refers to the challenges of critical design as the social technical gap, something neglected by current implications for design, not only at a functional level, but also a creator of socio cultural events, meaning and relationships. Where all design is critical the socio-technical gap is an opportunity either to influence and use that gap to maximise the effects of design or to integrate with the least amount of impact.

The ethnographic perspective holds that technology is meaningless without practice: Ethnographic work focuses on how practice brings technology into being. The interplay and these dependencies are pathways to understanding how that meaning might be adapted or moved towards a particular type of experience. (Consider interplay and dependencies to create new socio cultural events and meaning).

If we consider a calm pond as the setting for every day life and a falling pebble as the introduction of a new artefact the magnitude and frequency of these ripples represent meaning, functionality usability and other user requirements as constructs impinging on the user/consumer way of life, including the generation of new socio-cultural events. These events are directly related to the pebble shape, size, travel and impact speed. By changing the shape, size and impact speed of the pebble we can change the meaning assigned to that pebble and the events generated as a result of its integration. The ripples across a pond can be altered due to changes in the choice of

pebble; these choices are guided by our knowledge of the pond. Within the context of design the emergent implications for design from ethnographic work appears to offer limited space for a critical view, even though such an approach is well within the means of ethnographic work.

#### 4.3.1.3 The marginalisation of theory

Ethnographic work is interpretive: To understand the underlying drivers behind people's behaviour ethnographers observe the interplay between members of the community, reflect upon their own experiences having been immersed within the culture and as a result of their direct dialogue and interaction draw conclusions.

In the first instance ethnographic work documents the observed spatio-temporal sociocultural phenomena performed both prior to, and concurrently with, the analytical component. It has been identified that the analytical component has been marginalised through the translation of more traditional ethnographic approaches into design (Button and Dourish 1996), replaced by a list of implications for design, a truncated superficial portal into the rich empathy that full ethnographic work can support.

Dourish describes the typical composition or format for design implications as a section that can be long or short, often constructed by a series of bullet points, thus the primary evaluative criterion for ethnographic research used within the design domain overlooks the analytical component reducing ethnography to contextual inquiry. Dourish argues, there is more to be considered for inclusion into implications for design than the methodological approach of how these findings are derived. Making the point that ethnography was not adopted into design (HCI) but ethnographers were adopted into design (HCI) raising a concern towards how ethnography might be understood applied and adapted within a design environment.

When used within a design context, the theoretical basis of ethnography is being marginalised to a purely methodological tool set used for field based inquiry in naturalistic settings. The implications are for design as with the analytic component a reduction in value added by the ethnographic work. 'Implications for Design' threatens this valuable contribution that ethnography can make to the design practice. Dourish argues that the neglect of the analytical component is not due to its lack of implications for design because they often have more profound implications than listed facts and figures. The analytical component provides us with a new lens and new ways to imagine the relationship between people and technology, a new way to approach design.

### 4.3.1.4 The problems of representation and interaction

Establishing a deeper more foundational connection between design and ethnography has traditionally been complicated and the analytical component of ethnography has not been seen to hold implications for design in the same way as a reduced scenic approach to ethnographic work (Dourish 2006). Dourish groups the representation of ethnographic work into 'moments and models' and suggests that the very nature of presenting only a set of implications for design offers only a superficial layer of what ethnographic work has to offer restricting the communication of rich data not otherwise visible to the designer.

Ethnography as 'scenic fieldwork' focuses on moments offering descriptive accounts of spatio temporal activities; what happened, where and when. Scenic fieldwork is of course useful for design and the capture of requirements to understand the immediately apparent requirements of consumers yet without the underlying appreciation of why and how these beliefs have been derived.

More fundamental than the account of what happened are the models for understanding social settings, the explanatory frame and narrative connecting the events and activity within the setting. A simple example would be to consider the communication of a piece of music through notation when compared to the performed melody. Even with the analytical component intact, a list of implications for design is inherently limited when seeking to facilitate the necessary empathy, due in part to its restricted arrangement and communication, to design and develop engaging products.

Suchman (2002) reflects on her experiences in conducting industrial design oriented ethnography. Drawing comparisons between what the early requirements were for anthropologists requested by colonial administrators and how these requirements are similar to those demanded by the design process, objective, instrumental, and actionable accounts of social life or in the design scenario, accounts of users and workplaces.

Dourish makes some implications for design as a conclusion to the paper to guide the design of research studies and of research programmes. Where the goal is to inquire into complex socially organised settings, a range of methods are already available and Dourish (2006) refers to these as discount ethnography, specifically contextual inquiry, cultural probes and related approaches. Dourish (2006) states that contextual inquiry is aimed at those with neither the training nor the time to conduct ethnographic work; instead contextual inquiry is a set of methods to move designers outside of their office or laboratory settings as a basis for design inspiration. He also

explains that cultural probes and other related approaches such as technology probes arose within the design community as a means to conduct broad based surveys of user experience. Cultural probes are self report packages of artefacts, questionnaires, and exercises that encourage users to reflect, often provocatively, on their experience. The data generated by the probes are intended to provide inspiration rather than be the basis for analysis. When time is at a premium these techniques are used in place of full ethnographical methods, although they fail to capture what ethnography captures lacking the coupling of both analytical and methodological concerns. Dourish states that these are rejections of ethnographic inquiry rather than variants and are techniques that do place primary importance on the implications for design and the current representation.

Dourish suggests that a list of design implications, formulated by an ethnographer is not the most effective or appropriate method. Ethnography provides insight into the organisation of social settings, but its goal is not simply to save the reader a trip; rather it provides models for thinking about those settings and the work that goes on there.

> "The value of ethnography, then, is in the models it provides and the ways of thinking that it supports"
> (Dourish, 2006)

# 5.0 Barriers for Designers: What are the likely practical and philosophical barriers faced by designers when designing for emotion?

## 5.1 Introduction

The views of engineering designers related to design and emotion have been discussed to identify the philosophical and practical barriers that may exist when designing for emotion. The discussion was based on a focus group session and one-to-one interviews with a sample of engineering designers.

There is a need for engineering designers to embrace a wider spectrum of user requirements to facilitate positive user experiences that may lead towards increased product sales, consumer loyalty and greater competitive advantage over alternative product offerings. (McKim, 2001; Norden and Guldbrandsen, 2003; Burns and Evans, 2000; Denning, 2003; Hekkert and McDonagh, 2003; Bruseberg and McDonagh-Philp, 2002; Desmet, Overbeeke, and Tax, 2001; McDonagh-Philp and Lebbon, 2000; Landmann, Wolters et al, 2001; Stompff, 2003).

## 5.2 Aim

The aim of this study was to identify the likely practical and philosophical barriers faced by designers when designing for emotion

## 5.3 Objectives

- To offer an insight into the engineering design practitioners' view, from their own design practice, on the integration of consumer needs that extend beyond the functional.

  To appreciate how practitioners may adopt a more inclusive approach to include the emotional aspects of consumer expectations for future projects.

- To discuss the engineers' view of design and emotion at a philosophical level and in its practical application.

## 5.4 Method

This study programme was conducted with participants from a broad range of professional engineering backgrounds, with over 160 years collective professional experience in engineering design, to reveal the engineering design practitioners' views on the emotional domain in design, to help identify any actual or perceived barriers that may exist.
The study used a focus group discussion and survey to collect the data conducted within the engineering department at PIPS Technology Limited (UK). PIPS began to develop traffic camera technology in the early 1990s with the patented development of pulsed, narrow wavelength retro-reflective techniques for image capture. They specialise in traffic related video imaging and licence plate capture technology. Current operation centres include offices in Chandler's Ford, Hampshire (United Kingdom) and Knoxville, Tennessee (USA). The company is now part of the Federal Signal Corporation.

The focus group provided data of a qualitative nature such as the design engineers' views and perceptions of designing for needs beyond the functional. The survey provided quantitative data with engineering designers rating their level of agreement to pre-set statements regarding the emotional domain within design. A comparison of the data helped to ensure that the focus group provided a true account of the individual design engineers' views and did not represent a 'politically correct' viewpoint influenced by peers in the group or other senior members. Findings from this study provide both the engineering designer and design educators with useful guidelines for exploring and integrating greater consideration for the emotional aspects of consumer/user experience.

This study adhered to the research strategy detailed within Chapter 2.0 of this thesis. The group was presented a sequence of questions and discussion stimuli. The group consisted of six design engineers comprising of a Technical Director, Principal Design Engineer, Senior Hardware Design Engineer, Graphical User Interface-Software Design Engineer, Principal Mechanical Design Engineer and Sales Executive. Table 5-1 provides a profile of each of the purposively sampled participants.

**Table 5-1: Participant profiles for exploratory focus group**

| Title | M/F | DOB | Experience | Professional experience | Professional recognition |
|---|---|---|---|---|---|
| (1) Technical Director | M | 1952 | 32 yrs | Homeland security, law enforcement ANPR Technology (Automatic Number Plate Recognition) | BSc, PhD |
| (2) Quality and Principal Engineer | M | 1945 | 39 yrs | Ministry of Defence special projects manager | BSc, MSc, CEng MIEE |
| (3) Graphical User Interface (GUI) Engineer | M | 1942 | 42 yrs | WEB interface design. Explosion proof inspection equipment user software Aircraft navigation systems | MIEE |
| (4) Senior Hardware Engineer | M | 1954 | 30 yrs | Digital Electronics, Telecommunications, domestic to industrial goods | |
| (5) Sales Executive | M | 1970 | 14 yrs | Police force and public safety. Law enforcement technology sales | |
| (6) Mechanical Design Engineer | M | 1979 | 7 yrs | Mechanical design explosion proof equipment. Roadside furniture. Consumer products, ANPR mechanical enclosures | MDes, MIED, IEng |

Each participant was selected on the basis of engineering design knowledge, experience and scope for rich and diverse views towards designing for emotion. The group's engineering design experience is extensive and ranges from every day consumer products to Ministry of Defence and Homeland Security products and systems.

### 5.4.1 The Focus Group

Qualitative and quantitative data were gathered through the use of a focus group session and survey. The focus group discussion was video recorded for in-depth analysis and extraction of relevant views and comments from the group. One of the key benefits of focus group discussion and activity is the synergetic effect that can support the sharing of participants' feelings, experiences and aspirations. Body language, facial expressions and vocal tone can also help the researcher to interpret the findings more accurately.

The focus group was facilitated through a set of open-ended questions and statements that the participants discussed among themselves, sharing their views and opinions with the group. Questions are shown in table 5-2: -

**Table 5-2: Focus group questions for exploratory focus group**

| | Focus Group Questions |
|---|---|
| 1 | Can you describe something in your home/office that annoys you?<br>Can you describe a cherished item? |
| 2 | How do you currently gain user empathy? |
| 3 | What are your views on user-centred design in engineering organisations? |
| 4 | What approaches do you think one could take to elicit user requirements and needs? |
| 5 | How do you review and communicate your ideas to the end user?<br>Do you hold design reviews for inter-team and customer/consumer communication? |
| 6 | What value can be added by spending time in the identification of consumer usability, cognitive and emotional requirements? |
| 7 | What are your thoughts on the design approaches currently taken within engineering companies to develop user empathy? |
| 8 | How would you justify the inclusion or exclusion of requirements beyond the functional in the design process and its introduction into the overall design brief and specification? |
| 9 | What are your views on design for emotional response and a particular user experience? |
| 10 | How would you improve the design engineers' role in designing effectively for the end user? |
| 11 | In a single sentence what is your view on the added value of user empathy in engineering design? |

### 5.4.2 The Survey

Quantitative data was gathered through a survey to elicit specific views towards designing for the less tangible of user requirements, the expectation of training requirements and added value of design for emotion, preparation for successful integration, re-evaluation of the design engineer's role and rating the importance of designing for a positive user experience. These questions and statements as shown in table 5-3 were rated against a scale of seven (1= strongly disagree to 7 = strongly agree) as shown in table 5-4 with the average value assigned to each comment in Table 3. Questions were designed to encourage and stimulate conversation, to expand upon current views and themes within the engineering profession and how these certain approaches or modes of design would affect their engineering design practice.

**Table 5-3: Survey questions and averaged scores**

| Survey Results |
|---|
| How important do you find the emotional domain? |
| Rate the importance of adopting a user centred design approach |
| Products need to satisfy needs beyond functional |
| Functionality alone does not guarantee acceptance, purchase or use |
| Part of the Design Engineers role is to demonstrate user/consumer empathy |
| Adopting a user centred approach, designing for emotion and user experience is time consuming with limited value |
| The integration of supra-functionality to engineering products can be easily integrated into the existing design process |
| Engineers will be reluctant to embrace design and emotion as a fundamental element of successful engineering design |
| To successfully integrate user centred design and emotionally aware engineering products requires significant training, a well developed and constant design review process. |

## 5.5 Results & Discussion

The focus group results have been divided into two groups and broken down into two themes, practical and philosophical barriers. The following section represents the views expressed by the participants.

### 5.5.1 Practical Perspective and Opportunity

Consumer feedback is currently elicited by the sales team and noted that most user contact took place towards the end of a development cycle, described by one participant as “Carving usability on at the end” (subject 5).

The design engineers were concerned that they have limited methods and techniques to elicit user needs when designing for user experience.

Although designing for a user experience would take time at the onset of a project, it was highlighted that a user-centred approach results in a better product and increased sales. However, the engineers took a technology-centred approach with a prime focus on getting the product to work in the laboratory environment with limited consideration for extended user needs. Products were rarely reviewed and communicated to potential users until it was too late, although design reviews are a common element of any design process. Evidence suggests that more emphasis is needed in this area.

It was suggested that regular design and usability reviews should take place before, during and after the design cycle. “The thing that we never do and we should do is actually have a formal review of the usability. We have formal reviews of the engineering, reviews of the production, but nobody ever sits down and says how could I actually make it more appealing and easier to use?” (subject 3).

There is a damaging effect if emotional and usability needs are considered too late in the design process. Far too often user feedback is only gained once a product has been sold, damaging both the company profile and future sales. Design engineers should actively field-test [with users] the products that they design. A series of training exercises would be necessary to achieve this, accompanied by an improved design review process.

### 5.5.1 Philosophical Perspective and Opportunity

Design engineers appreciate the need and recognised the importance of considering needs beyond the functional. “We need to start mapping our technology into something the user understands.”

The group reported having received negative consumer responses to particular high-end technology products experiencing usability barriers. It was expressed that if the “User [is] force fed [that is] not user centred” (subject 5). Concerns were raised that as engineering organisations continue to focus on technology led projects, little attention is being paid towards the user’s more emotional needs. Positive feedback is often gained not through technical functionality but ‘excitement’ and ‘delight’ through product use, placing more emphasis on user needs and the consideration of these wider requirements should be an integral part of the design brief and functional specification as a tangible item or deliverable that creates the desired experience.

Designing for an emotional response or need is “Definitely important. It’s almost impossible to measure or quantify, I think it’s different in different market sectors, making complex equipment look sexy. It’s brilliant, it really is” (subject 3).

The conscious consideration of aesthetics and product semantics often resulted in more attractive, less complex and approachable technology. Participants felt that low technology products often have a better ‘emotional’ response than high technology items due to the integral simplicity rather than actually being designed for ease of use.
When asked, “In a single sentence what is your view on the added value of design for emotion?” The following replies were given:

“If a customer buys 500 units from us, they’re not going to buy 500 units that often. The crunch line is: would they buy 500 if they had another 500 to buy? So the added value is that they would buy it again. And the user empathy will directly affect that” (subject 5).

“I think for me having user empathy is that every time I use it I get a warm glow from it. If you’ve got empathy with it you never lose the fun of using it. Every time you use it, you think I’m glad I bought that, I made the right choice, so you re-enforce the decision you took. I think it’s just the opposite when it doesn’t work properly. It winds you up so much. So I think that’s the value every time you use it [a successful product], you still get this warm glow” (subject 3).

**Table 5-4: Survey questions and averaged scores**

| Survey Results | Scale |
|---|---|
| How important do you find the emotional domain? | 5 |
| Rate the importance of adopting a user centred design approach | 6.25 |
| Products need to satisfy needs beyond functional | 5.75 |
| Functionality alone does not guarantee acceptance, purchase or use | 6.5 |
| Part of the Design Engineers role is to demonstrate user/consumer empathy | 5.75 |
| Adopting a user centred approach, designing for emotion and user experience is time consuming with limited value | 2.75 |
| The integration of supra-functionality to engineering products can be easily integrated into the existing design process | 4.5 |
| Engineers will be reluctant to embrace design and emotion as a fundamental element of successful engineering design | 4.5 |
| To successfully integrate user centred design and emotionally aware engineering products requires significant training, a well developed and constant design review process. | 5.5 |

The results appeared to support the initial concerns that design engineers demonstrate little consideration in designing for emotional and usability needs. However, the engineering designers expressed a significant appreciation for the added value of considering these needs in the engineering design process.

Within the study it was identified that limited consideration for user needs is not due to reluctance in embracing emotional aspects of design but that engineering designers perceive that they do not have the tools to elicit user needs and so remain isolated from the end user. Bruseburg and McDonagh-Philp (2002) found that industrial designers shared this perception; Industrial designers are developing research tools for designers. There is no reason why design engineers cannot adopt, adapt and develop such approaches and methods. Cross (2000) refers to "listening to the voice of the customer" (p. 107), but as customers (users) say one thing, do another and

possibly feel something else, listening alone may not be enough. It is increasingly important for product developers (Design engineer, Industrial designer, and manufacturer) to become as intimate with the users as possible. One cannot substitute another person's experience, but increased empathy, understanding and awareness can lead to more effective designs. Simple technology-led products developed through the engineering design organisation are often easy to use, not due to a user-centred approach but because of their intrinsic simplicity i.e. The product's ease of use is often a result of chance rather than good design.

This study has highlighted that as technology-led organisations continue to progress and develop, more emphasis must be placed on designing for a positive user experience. As an engineering design organisation grows there comes a point when these requirements must be considered in their own right. As one participant commented, if the user is 'force fed' then it is not user-centred design. As technology advances, the ability to successfully map new technology into a usable interface becomes increasingly difficult. The study indicated that user empathy is still very much considered towards the end of a development cycle, resulting in adding on usability rather than integrating it within the process. The participants felt that to effectively design emotionally engaging products would require significant training accompanied by a well-developed and constant design review process.

Engineering designers tend to take a technology-centred approach with a prime focus on getting the product to work in a laboratory environment. As a consequence in the discussion it was noted that these technology-led decisions begin to define product architecture and demonstrate little user consideration. It would be more beneficial if design engineers were more involved in eliciting user feedback rather than relying on pre-filtered data from the sales and marketing departments. The design engineer may rely solely on the pre-filtered data, which may not accurately reflect user needs. It was felt that adopting this approach into the existing design process would add significant value. Although designing for a user experience would take time at the outset of a project it was believed that greater consideration would result in better products and increased sales. Providing satisfactory function alone does not necessarily lead to product acceptance or use; few engineering designers appreciate the added value of designing for emotion and may find it difficult to develop successful user-centred products.

Tools for integrating consumer needs both hedonic and utilitarian may share the same title from one project to the next but can be extremely different in the requirements they consider. A flexible approach needs to become an integral part of the engineering design process, applied holistically and integrated with the engineers' pre-defined sources of information. Engineers quite often work in isolation with minimal input from an industrial designer or consumers in the design process.

The late involvement of the user within the engineering design process results in a product foundation being laid down without consideration beyond utilitarian needs.

When the engineering professions embrace the more emotional aspects of design, then engineering design education may reflect and respond to the paradigm shift towards greater consideration of both utilitarian and hedonic requirements.

There is an opportunity for design curricula in higher education to place greater emphasis design research as a set of skills with extremely high strategic value. Designers need to understand the tools of research, how they are deployed, how they should integrate within the various stages of the design process, and how research findings can contribute to both innovative and evolutionary design practice (Laurel, 2003).

## 5.6 Conclusions & Recommendations

As technology evolves and further dislocates itself from the consumer's basic understanding, design engineers are responsible for mapping complex details into a usable interface and product experience. Technical functionality alone does not substantiate market success. Empathy towards human cognitive, physical and emotional needs must now be considered and integrated within the designing process. In order to develop such products, training and educational requirements have been identified as a requirement for the engineering design practitioner.
Training for the engineer needs to consist of designing for a user experience, usability testing, verbal and non-verbal communication skills. These interpersonal skills will strengthen the bond between engineering design and sales departments also enabling the design engineer to actively participate and conduct focus group research where interaction and communication with the end user is of extreme importance. These skills enable the elicitation, probing, guiding and redirection of group discussion to extract the most useful data.

Formal training on conducting focus groups and usability reviews that coincide with the existing engineering review process was identified as being beneficial. implemented as part of a trilateral review process supporting the development and review of Design, Usability and Manufacture.

Usability testing, scenario evaluation, product role-play including other research and evaluation methods may be conducted both internally and externally by the design engineer and user groups. An external usability test house only postpones the design engineer gaining first hand experience, insight and empathy with users. Implementation of an iterative review process, user

testing and qualitative research techniques will support more effective product outcomes, based on increased empathy and awareness.

The added value of these considerations can be significant but requires effort and support from the engineering and design organisations. There is a fundamental difference between knowing and doing. The knowing and doing problem can be described as “The challenge of turning knowledge about how to enhance organisational performance into actions consistent with that knowledge” as discussed by Holdway and Walker (2004).

It is time for the Engineering Designer to elicit user needs, both technical and emotional; negotiation and discussion techniques must be adopted to generate the necessary data. The design engineer and salesperson must work closely together on new research and development projects. It may be suggested that a dedicated design resource be employed within organisations to address these wider expectations; a role often played by industrial designers in the design team. To conclude, the small sample of design engineers appeared receptive to adopting a wider approach to their view of the user, willing to embrace new skills and techniques in designing for a positive user experience.

## 6.0 Emergent Themes from the Literature

After having carried out the initial literature review and the exploratory study five key themes/concepts emerged:-

1. **The need to exceed expectations to delight**
2. **The need to overcome narrational dissonance to access the 'truth'**
3. **The need to provide greater access to the context to orientate findings**
4. **The need to improve accessibility to insight and communication**
5. **The need to adopt and adapt ethnographic inquiry**

These themes have been outlined below and explored further as part of a second level literature review.

## 6.1 Exceeding Expectations

Designing for emotion is about designing for consumer pleasure, loyalty and attachment through delight, exceeding expectations at every level within a hierarchy of product need (Oliver, Rust and Varki, 1997; Jordan, 2000; Evans and Burns, 2007; Desmet, 2010). Rust Oliver and Varki (1997) refer to customer delight as "a profoundly positive emotional state generally resulting from having one's expectations exceeded to a surprising degree". The belief that products evoke positive emotional responses when exceeding consumer expectations is referenced as well established by Chitturi, Raghunathan and Mahajan (2008), who in turn reference Mittal, Ross, and Baldasare (1998); Oliver (1997); Reinmoeller (2002). Berger et al.(1993); Kano, Seraku, Takahashi, and Tsuji (1984); Pardee (1996); Oliver (1997); Cross (1994), discuss delight and delighting features with various descriptive titles such as "attractive quality" and "Positively outrageous service": In all of these instances the criteria for delight are the same; to unexpectedly or surprisingly go beyond what is expected.

The criteria for delight may be the same for all requirements. However, not all requirement types yield the same level of consumer pleasure, satisfaction and delight (Sauerwein, Bailom, Matzler

and Hinterhuber 1996; Kano, Seraku, Takahashi and Tsuji, 1984). The criteria for delight and satisfaction are markedly different (Rust, Zahorik and Keiningham 1994).

The market research profession turns to psychological theory to understand delight, where 'delight' is seen as a post purchase emotion resulting from the consumer's evaluation of product or service performance and is assumed to be an extension of satisfaction characterised by positive affect'

(Oliver, Rust, Varki, 1997).

The disconfirmation theory of customer satisfaction is the most widely accepted theoretical definition of delight (Kotler, Armstrong, Saunders and Wong, 1999; Mano and Oliver, 1993).

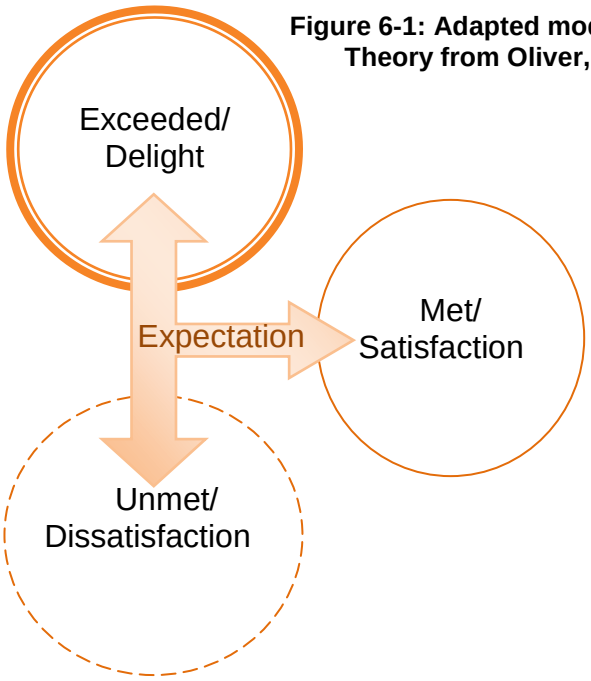



**Figure 6-1: Adapted model of Disconfirmation Theory from Oliver, Rust and Varki (1997)**

Chitturi, Raghunathan and Mahajan (2008) state that high levels of customer satisfaction do not always result in customer loyalty; as many as 60% of satisfied customers actually switched between brands. Jones and Sasser (1995); Keiningham and Vavra (2001); Reichheld (1993); Chitturi, Raghunathan and Mahajan (2008) agree that customers are looking for more than satisfaction; they are seeking to be delighted (Keiningham and Vavra 2001; Norman 2004; Rust and Oliver 2000). In addition to identifying consumer values, aspirations and sociocultural norms, the pre-purchase expectations and the evaluation of reality against these expectations is recommended. Consumption research has been criticised for failing to consider customer desires

in addition to expectations (Burns, Evans, Johansson and Barrett, 2000), calling for more research to look at individual consumption emotions through interpretive and phenomenological strategies. See Richins as cited in Burns et al. (2000).

Chitturi, Raghunathan and Mahajan (2008) state that exceeded utilitarian benefits associated with prevention goals and the alleviation of pain evoke satisfaction, whilst the hedonic benefits meet promotion goals to enhance pleasure and delight.

Szymanski and Henard (2001) cite Oliver (1997) and Bearden and Teel (1983). Oliver (1997) proposes three phases of satisfaction that result in action-loyalty, repeat purchase and use; cognitive satisfaction, affective satisfaction and conative satisfaction.

### 6.1.1 Requirement or Expectation Types:

These can be defined in several ways:-

- Utilitarian (must have/prevention goals) versus Hedonic (aspirational/promotion goals) (Chitturi, Raghunathan and Mahajan 2008)
- Expected, wanted, unexpected (Kano, 1995)
- Concerns: Attitudes, Standards and Goals (Desmet and Hekkert, 2002)

### 6.1.2 Requirement Types:

These may be manifest in a variety of ways:-

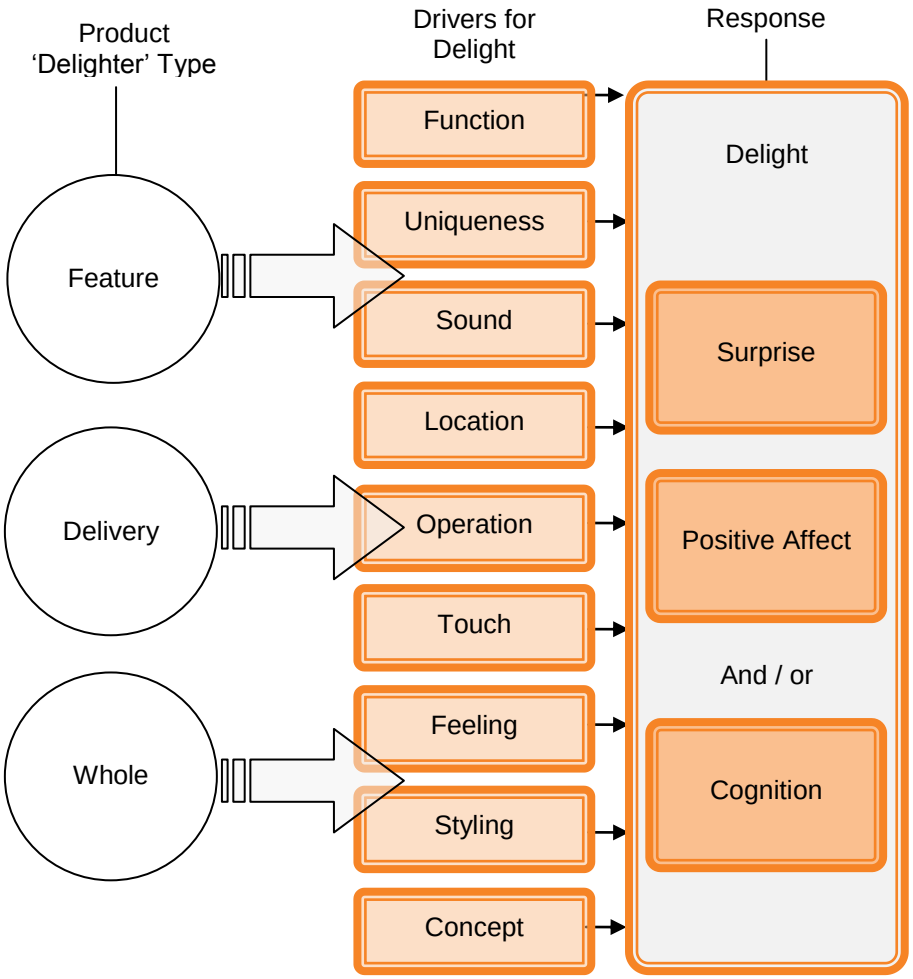
- Feature, Delivery, Whole (Evans and Burns 2000)
- Physio, Psycho, Ideo, Socio (Jordan, 2000)
- Assimilated delight, re-enacted delight, transitory delight (Rust Oliver, 2000)
- Emotional Experience, Aesthetic Experience, Experience of Meaning (Desmet and Hekkert, 2002)
- Cognitive satisfaction (first exposure), affective satisfaction (emotional state), Conative satisfaction (cause to action and use) (Oliver, 1997).
- Product as Object (observation), Agent (Activity/Enabler/Purpose) and Event (anticipate implications of use (Desmet and Hekkert, 2002)

### 6.1.3 Three Varieties of Delight

Oliver (1997) identifies three varieties of delight: Assimilated delight generally refers to delighting features that migrate towards being assumed as standard and tend to be technological features. The second variety of delight is referred to as re-enacted delight and one of enticement; although the delighting emotion will fade the memory is retained and looked back upon with fondness. The enticement function of delight can be experienced at will.

Oliver (1997) refers to the third variety of delight as transitory delight. Where the consumer forgets the delighting experience before the next purchase cycle and then re-experiences that delight with each purchase and use. These requirement types are not only delivered via the inclusion of a requested or unexpected feature but also the way in which the feature is delivered and the total product experience. Evans and Burns (2000) propose a model of delight (figure 6-2) during product evaluation emphasising that delighters are more than simply functional innovations answering unarticulated consumer needs and should be considered in terms of their delivery as having a significant effect on delight.

**Figure 6-2: Model of Delight adapted from Evans and Burns (2000)**



### 6.1.4 Utilitarian and Hedonic Benefits

Consumer values and aspirations are well within the hedonic domain and fundamental to the view that objects are a means of communication, an extension of oneself to desire or avoid products and features appraised as either beneficial or harmful to the consumer. The phenomenon of self projection onto our surroundings and possessions is central to the realisation of hedonic satisfiers when human values and aspirations are met or upheld by a particular purchase (Higgins, 1997; Higgins, 2001). Practical, functional and instrumental benefits are considered utilitarian; these are enablers that empower the consumer. Aesthetic, experiential and pleasure/enjoyment benefits are considered hedonic (Batra and Ahtola, 1990; Chitturi, Raghunathan, and Mahajan, 2007; Dhar and Wertenbroch, 2000; strahilevitz and Myers, 1998; Holbrook, 1999).

These two benefit types have been the subject of much recent research (Chitturi, Raghunathan, and Mahajan (2007); Dhar and Wertenbroch (2000); Kivetz and Simonson (2002b); Okada (2005); Voss, Spangenberg, and Grohmann (2003). Chitturi et al. (2007) consider that greater importance is assigned to hedonic pleasure only once utilitarian expectations have been met, whereas Kivetz and Simonson (2002a) propose greater significance is associated with utilitarian benefits unless the consumer feels they can justify the hedonic benefits of a particular pre and post consumption experience.

Chitturi, Raghunathan and Mahajan (2008) offer a conceptual framework (see figure 6-3) founded upon the work of Mano and Oliver (1993); Oliver (1997); Rust and Oliver (2000); Westbrook (1987), to show this interplay between hedonic and utilitarian benefits and their positive and negative post consumption emotions.

> "Utilitarian benefits fulfil prevention (Must have) goals and alleviate pain, hedonic benefits fulfil promotion goals (aspirations) and enhance pleasure"
>
> Chitturi et al. (2008).

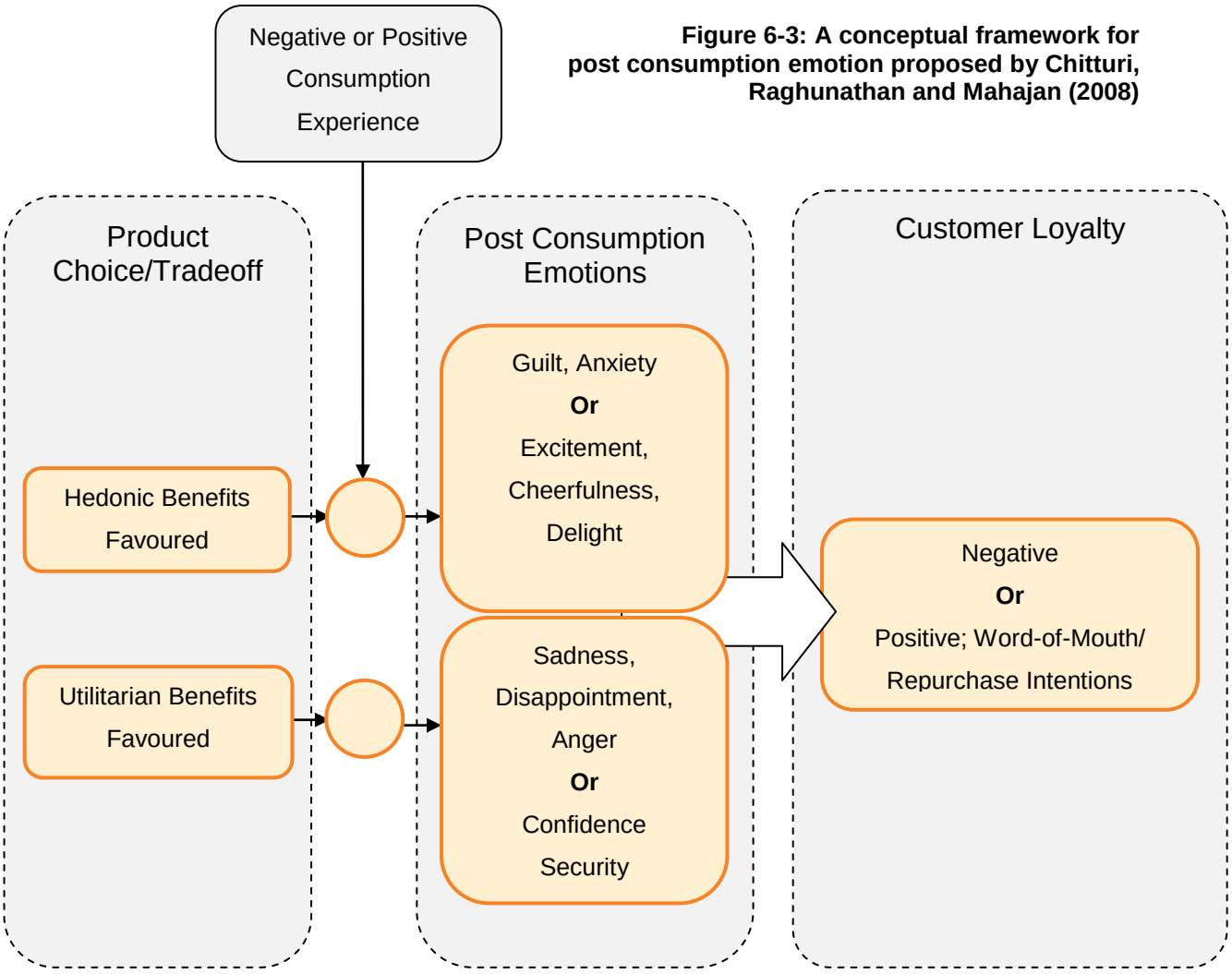
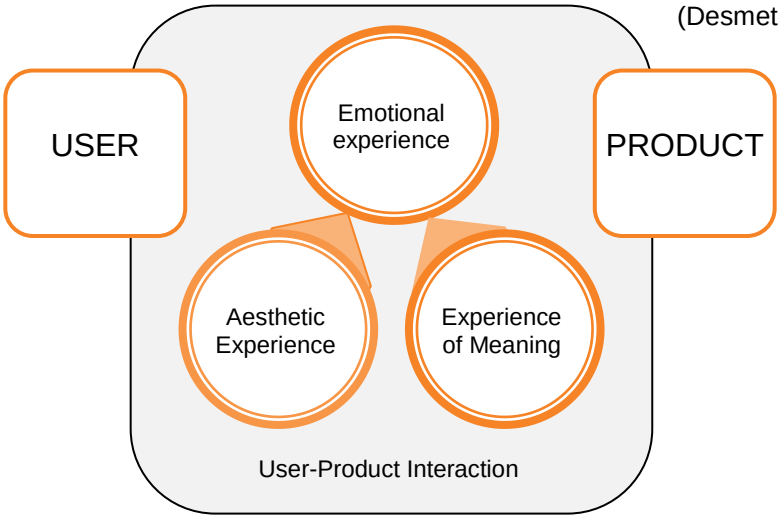



**Figure 6-3: A conceptual framework for post consumption emotion proposed by Chitturi, Raghunathan and Mahajan (2008)**

### 6.1.5 Product Experience

Desmet and Hekkert (2007) introduce a framework for product experience claimed as applicable to all human-product interaction affective responses.

**Figure 6-4**
Framework of product experience (Desmet and Hekkert, 2007)



The framework (see figure 6-4) outlines three components of product experience as the domains in which the design practitioner can intentionally facilitate affective responses within the consumer to influence the overall product experience, during, pre and post consumption behaviour. These are aesthetic experience (sensory modalities), the experience of meaning (self projection, personal and symbolic significance and individual standards), and lastly the emotional hedonic experience. Product characteristics and their appraisal against the consumers' standards, goals, and attitude directly influence product attachment to influence positive emotional experiences and re-purchase decisions. (Govers and Mugge, 2004).

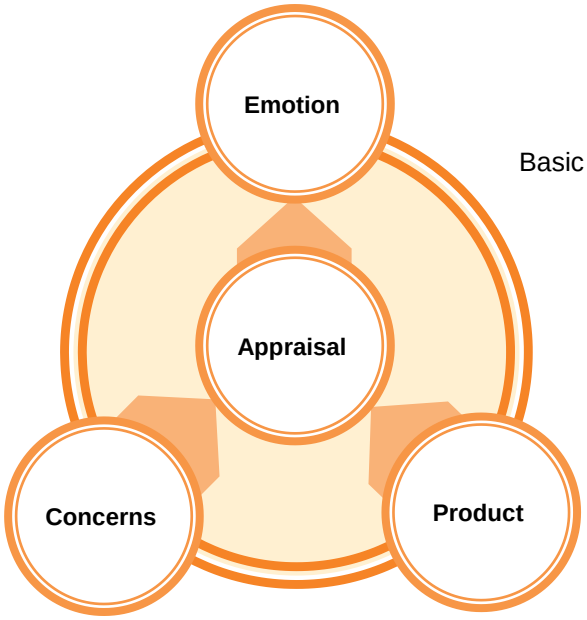



**Figure** 6-5
Basic model of product emotions
**(Desmet, 2003).**

The event, product or other stimuli in themselves do not evoke the emotion, it is the appraisal of the external stimuli against the consumers concerns; goals, standards and attitudes that realize the felt emotion (Respectively who do I want to be, who should I be and who am I).

## 6.2 Overcoming Narrational Dissonance

It is widely accepted that what people say, do and think are often different things (Wilson 2002). This inevitably remains a fundamental challenge to new product development. When people seek to explain their actions or how they might behave in a given environment, these descriptions are subjected to 'story telling': A type of narrational dissonance embedded within the descriptions and beliefs individuals hold and portray about their own behaviour. This is not to say that people are intentionally misleading. It is in fact quite the opposite. The stories that people tell themselves to justify their behaviour are in the main genuinely believed to be true by themselves as an accurate representation of their motives and actions. The process of requirements capture is fraught with these communication obstacles.

Nuseibeh & Easterbook (2000) turn to cognitive psychology to provide an understanding and highlight the difficulties people may have in describing their own needs or requirements. They exemplify this phenomenon where problem domain experts who demonstrate large amounts of tacit knowledge are often not open to introspection; as such answers to questions may not match behaviour. In much the same way that consumers often find it difficult to articulate their needs and wants, (Nuseibeh, Easterbook, Johansson, Burns, Evans, Barrett, Karlsson, 2000; Wasson, 2000) resulting in misleading requirements and specifications that do not reflect the real needs of the consumer (Kotonya and Sommerville, 2002). There are misunderstandings between consumers, those developing the requirements and the designers developing or maintaining the product. Nuseibeh, Easterbrook (2000) highlight Anthropology and Ethnography as the preferred methodology when observing human activity.

The communication methodology has been identified as one of the most important aspects of requirements elicitation when validating divergent goals and incompatible beliefs. Nuseibeh and Easterbrook (2000) urge that the process of requirements capture places greater emphasis on the understanding of consumer beliefs; what is observable and what is objectively true.
The integration of customer information into the early stages of design is poor (Johansson, Burns, Evans, Barrett, Karlsson, 2000). Requirements are often subjected to a certain amount of interpretation analysis, modelling and validation (Nuseibeh Easterbrook, 2000).

To a great extent, elicitation techniques are influenced by the choice of representation and vice versa where theoretical models and the representations of captured requirements imply a particular research technique. It is important not to limit the collection methodology to fit in with a particular communication format. The communication format must follow the collection methodology, to be presented in a usable way, whilst remaining sensitive to any narrational dissonance. For example current tools such as Quality Function Deployment (QFD) are only as good as the customer requirements fed into the system. Traditional market research techniques have limited scope for capturing true customer requirements on the basis that customers have difficulty in articulating their true needs (Burns et al. 2000). This difficulty is further exaggerated when converting the customer wants into engineering hows. More recently, this has led towards a distrust of customer feedback and a tendency to ignore or pass over their input (Lutz, 1998 as cited in Burns et al 2000).

## 6.3 Provide Greater Access to the Context

The context of product use plays a central role in compiling requirements for new product development, remaining sensitive to the implications of change embraced by the critical nature of design. It is well recognised that specifying product requirements generally starts with observing and interviewing people (Ambler, 1998).

Design is more than solving a technical problem as most design methodologies describe (Schon, 1983). A perspective challenged by design research (Schon, 1983) where technology is viewed as society shaping and socially constructive (Biijker et al. 1987).

Design has been recognised as both technical problem solving and problem setting. To understand and recognise the importance of context (Forester, 1989) in the discipline of participatory design, in recent times, there has been a greater focus placed upon the user and the methods used to achieve particular tasks. On the basis that consumers' motives and actions, their pre and post purchase behaviour, are social work, it is fundamental that this behaviour and any interpretation are viewed in context (Greenbaum and Kyng, 1991).

Although technology providers have a thorough knowledge of their products they are often deficient when it comes to the social context of product use (Hughes et al. 2000). To better understand these environments and the social context, observation is considered fundamental as a starting point (Hughes, O'Brien, Rodden, Rouncefield and Viller 2000). Forsythe (1999) emphasises the importance of context where ethnography is the ideal candidate for consumer insight. Forsythe (1999) highlights the universal understanding within the literature that Anthropologists have been applying ethnographic methods as far back as the 1970s to support design practice. Specifically with a foundation in software design and evaluation, ethnography is now regarded as a reliable skill in technology design supported by Lundsgaarde, (1987); Suchman, (1987); Fafchamps, (1991); Forsythe and Buchanan, (1991); Blomberg, Giacomi et al., (1993); Nyce and Timpka (1993) Forsythe (1995); Suchman (1995); Nardi (1996).

Sauerwein, Bailom, Matzler and Hinterhuber (1996) encourage a detailed analysis of the context and conditions of the product application to elicit the full spectrum of consumer requirements. Customer interviews are useful to identify visible product requirements and concerns but they are considered an insufficient method when seeking to elicit potential new and latent consumer requirements (Sauerwein, 1996). There is much demand for greater numbers of contextual studies to inform design. Obrist, Bernhaupt and Tscheligi (2008) claim that there is a lack of contextual studies particularly related to the home and empirical data on users domestic activities

for the development of new technology (Blythe, Overbeeke, Monk & Wright, (2004); Mateas, Salvador, Scholtz & Sorensen (1996); O'Brien, Rodden, Rouncefield, & Hughes (1999).

Obrist et al. (2008) support the importance of context for requirements capture and they state emphatically that contextual inquiry (in the home) must look at background issues, including differences between the home and other environments, peoples motivation behind the use of domestic technologies and patterns of use and their difference from user to user, and the social interaction and relations between household members.

Obrist, Bernhaupt, Tscheligi (2008) cite that getting the right combination of methods to elicit consumer needs from their daily activities is a big challenge. Glock (2003) explains that engineering design is more than providing a technical solution to predefined ends but designing is also about interpreting users wishes and needs, translated into technical artefacts (Woolgar, 1994) which again can be considered separately from the context of use. Callon (1987) urges engineering designers to consider themselves as engineering sociologists. Forlizzi (2007) also writes that the design activity has now moved beyond the focus of task interaction between the user and product to include how the product and the user are situated socially and culturally among communities of people, describing how researchers have turned to ethnographic methods to gain this understanding.

Design researchers have recognised the importance of the relationship between technology and its use, identified through field methods (As cited in Spinuzzi 2000: Beyer and Holtzblatt, 1998; Hackos and Redish, 1998; Schuler and Namioka, 1993; Wixon and Ramey, 1996). Through a survey of field methods Spinuzzi (2000) identified the three most prominent methods for exploring consumer requirements as ethnography, participatory design and contextual inquiry. Hughes et al (1993) and Wasson (2000) highlight ethnography as the preferred approach for requirements capture within the design process (Hughes, O'Brien, Rodden, Rouncefield, and Viller, 1993; Wasson, 2000).

The design community have turned to ethnography to overcome the challenges of requirements capture and there is much support to encourage the adoption and adaptation of ethnography into the process of design (Suchman, (1983); Suchman, (1987); Zuboff, (1988); Obrist, Bernhaupt, Tscheligi (2008); Nardi & Miller, (1990); Hughes, O'Brien, Rodden, Rouncefield, and Viller (1993); Nardi, (1993); Blomberg, Giacomi, Mosher and Swenton-Wall (1993); Goguen and Linde, (1993); Blomberg, (1995); Venkatesh, (1996); O'Brien and Rodden, (1997); Simonsen, (1997); Simonsen and Kensing (1998); Crabtree (1998); Nardi and O'Day, (1999); Forsythe, (1999); Nuseibeh, Easterbook (2000); Diggins and Tolmie (2003); Jones (2006).

## 6.4 Improve Requirements Access and Communication Format

In order to fully realise the potential of ethnographic work there are challenges the design community must face. It is apparent from the literature discussed that the communication format of U/CI to designers needs attention. The main areas of concern are considered to be the analytical component, the output and arrangement of ethnographic work for design practice.

Glock, Rendall et al., (1994); Button, (2000); Hughes et al, (1995); Hughes et al , (1997) and Diggins and Tolmie (2003) emphasise a much needed collaboration between ethnographers and designers, highlighting the importance of translating ethnographic outputs for design (Simonsen and Kensing 1998). Reliable and truthful design requirements and a description of a desired attribute or problem to be solved for are vital for successful product development (Darlington and Culley 2002). Despite the acceptance of ethnographic investigation Hughes, O'Brien, Rodden, Rouncefield, and Viller (2000) have raised concerns over the ongoing communication problem of ethnographic work. The integration of customer information into the early stages of design is poor.

Johansson, Burns, Evans, Barrett, and Karlsson (2000) suggest that one of the main reasons consumer requirements fail to delight the consumer is due to the translation of consumer statements into a usable format for designers. Failure to collect, interpret and communicate consumer expectations in an effective way has also been cited as leading to product failure and inevitably extra cost (Darlington and Culley 2002).

There is a call for representational tools and design based diagrams for the ethnographical output to be used by both the ethnographer and designer when communicating with each other (Button, 2000; Hughes et al, 1995; Hughes et al, 1997; Diggins and Tolmie 2003) The range of communication tools available offer analysis reports written for a research audience with generalised conclusions (Sleeswijk Visser, Van der Lugt and Stappers, 2007) upon which current practice relies (Lillis, 2002). Raw data, participatory transcripts, video diaries and interviews occupy the other end of the communication methods spectrum and are often too bulky for designers. They fail to address empathy, inspiration and engagement, where very few tools today address all three (Adams et al., 1998; Bruseberg and Mcdonagh-Philp, 2002; Bueno and Rameckers, 2003; Sleeswijk Visser, Van der Lugt and Stappers 2007). Not all designers are comfortable in recieving the analytical reports that may rely on the skills of a trained researcher, they do not have the time to analyse data from scratch, nor are they qualified to do so (Van Veggel, 2005; Bruseberg and McDonagh-Philp, 2002; Sleeswijk et al. 2007).

The design of ethnographic outputs for collaborative work is a relatively unexplored topic, with little to no overall consensus on how best to create formulations of ethnographic work for the purposes of design (Diggins and Tolmie, 2003). The communication format is more often resolved by local negotiation on a project by project basis. Diggins and Tolmie (2003) emphasise that what ever format, it must be immediately tractable.

Researchers have developed various ways of communicating these findings (as cited in Hughes et al. (2000): Beyer and Holtzblatt, 1998; Viller and Sommerville (1998): Hughes, O'Brien, Rodden, Rouncefield and Sommerville (1995); Twidale, Rodden, and Sommerville (1993); Viller, Sommerville, (1999)). Although methods are increasingly available Hughes et al (2000) argue that there is a lack of any unified representation of these methods.

Requirements often have to be subjected to a certain amount of interpretation analysis, modelling and validation. To a great extent the elicitation techniques are influenced by the choice of representation and vice versa where many modelling or representations of requirements captured imply a particular research technique (Nuseibeh and Easterbook 2000). It is important not to limit the collection methodology to fit in with a particular communication format. The communication format must follow the collection methodology and present itself in a usable way free from narrational dissonance

Spinuzzi (2000) believes that generalisations cannot be made from ethnographic data and highlights that time constraints within ethnography, as often imposed by commercial environments, are a stumbling block. In current approaches within requirements capture for design the aim is to identify general rules and empirical themes of causal factors to guide the design process. The risk of passing by key insights and making generalisations may lead to the reification of empirical results as common across consumer groups and applications. (Pahl and Beitz, 1984).

Gallant (2004) identifies a weakness in ethnographic study as the need to analyse at length non verbal behaviour which he believes tends not to provide usable data immediately. Gallant (2004) claims that 'communication ethnography' makes data ready to use almost instantly. This is, however, void of any triangulation to overcome possible narrational dissonance.

It appears that the need for improved communication between ethnographic output and design teams is not only due to the relatively new relationship between ethnography and design but also what can be seen as a conscious resistance from the ethnographic research community as suggested in the quotation below.

*"Our reluctance to translate our practice directly into design terms was met with frustration from the design community... Rather than feeling inadequate in the face of demands that our work produce implications for design, we began to resist those demands" (Suchman, 1994 p. 30-31).*

Ethnographic work seeks to avoid major disruption in the observed population. However, the critical nature of design is such that a 'before and after' approach may be necessary when using ethnographic work to inform design (Blomberg et al. 1993). This approach satisfies both domains of design practice and ethnographic work to offer a pre and post technology (service/artefact) insertion perspective.

Glock (2003) highlights this approach to ethnographic study and does not propose changes to the traditional ethnographic methods, but encourages a focus more on how designers interpret and translate the ethnographic output; turning consumer needs into goals and technical artefacts.

## 6.5 How to Adopt and Adapt Ethnographic Inquiry

The identification of consumer expectations is undoubtedly the most complex and critical process within product development (Parviainen, Tihinen, Lormans, and Solingen 2003). Eckert & Boujut (2003) highlight Ethnography as a 'powerful tool' unlike other methods of empirical study which are solution oriented to solve a practical problem or to develop a new technology born out of the engineer or CEO's head. This does not say these practical problems are not shared across a particular culture. However, they are limited to the mind of one or two persons far from the creative discovery of new markets that result from ethnographic approaches. Ethnographic work is used to identify requirements that the consumers themselves are unable to articulate thus making creative leaps into new areas of study and product development opportunities (Eckert & Boujut 2003).

In Design Research attempts are routinely made to inform product development through ethnographic studies in a multitude of domains (Hughes, et al. 1993; Hafner, 1999; Heath, 1997; Nussbaum, 1997; Posner, 1996; Robinson, 1994; Robinson and Nims, 1996; Weise, 1999; Wells, 1999; Wasson, 2000; Jones 2006). More specifically ethnographic video appears to be suited to the design profession, one that is already mostly a visually orientated practice (Wasson, 2000) Whilst ethnographic work has been widely recognised by the design community, Wasson (2000) highlights there are few published ethnographies and attributes this to the proprietary competitive advantage and intellectual property contained within them.

Supporting the use of ethnographic studies to contribute greater insight for designers and design teams Glock (2003) highlights a challenge in fully achieiving this, as raised by Rendall et al, (1994) where the highly qualitative language of ethnography may not be readily translated into a set of design specifications. The key difficulty experienced during the uptake of ethnographic approaches has been their translation into something useable (Eckert & Boujut 2003).

Design researchers clearly recognise the importance of the relationship between products and the user. (Spinuzzi 2000; Beyer and Holtzblatt, 1998; Hackos and Redish, 1998; Schuler and Namioka, 1993; Wixon and Ramey, 1996) regard ethnography as a reliable skill in product design. This has led to Anthropologists finding employment within new product development corporations and research laboratories but also non-anthropologists are now borrowing the ethnographic techniques (Forsythe, 1999; Bentley, Hughes, Randall, Rodden, Sawyer, Shapiro, and Sommerville, 1992; Blomberg et al 1993; Hughes, et al.1992; Luff, et al. 1992; Suchman and Trigg, 1991; Nyce and Lowgren, 1995).

## 7.0 A Case Study: Communication within a ‘Real World’ Design Team

## 7.1 Introduction

A contributing source towards a multi source governance framework, this study reveals the importance of good communication within the early stages of the design process, presenting a rare account of the engineering design process from within one of the UK’s fastest growing technology companies over a two and a half year period. This in depth, contextual study focused on a key strategic project for the company that was being run in parallel to other product development programmes, competing for the same design resources in the context of a high pressure design environment. The emergent themes from this study support the need to improve communication among design teams and highlights opportunities for their improvement.

Emergent themes are presented as opportunities for improvement and a basis for good design communication during product development.

## 7.1 Aim

The overall aim of this case study was to reveal a rare honest example of communication within the designing process, identify opportunities for improvement and to generate a grounded contribution towards a governance framework for the future communication of design requirements.

### 7.1.1 Objectives

- To document the events within the design process for a ‘real-world’ design team, evaluating a practicing designer’s methodology for new product development.

- To identify and categorise emergent themes throughout the study to formulate governance for improved communication among design teams.

- To explain complex causal links between poor communication and design outcome, through contextual enquiry.

## 7.2 Method

The study took place over a 2.5 year period; 10 months continuously between 17/05/2005 and 13/03/2006. After this date it was no longer viable to continue such thorough documentation of events; it can be said that the project progressed in much the same way and was observed with the same level of attention, resulting in an additional point to plot the path of the project's progress between 13/03/2006 and 12/12/07.

The community under observation was the design office for a small to medium. 14 million pound turnover, industrial (electromechanical) product development company, recipients of the Queens Award for Innovation and one of the fastest growing technology companies in the UK, listed within The Sunday Times Microsoft Tech Track 100 for 2004/2005. The study focused on the development of a new automatic number plate recognition camera for use within journey time measurement systems and homeland security applications worldwide. It is important to note; this was not a sponsored research project and the company did not direct the research programme in any way.

The usual time constraints and demands of every day product development could be felt, whilst data within the study were collected from this single product development programme whilst running in parallel to other new product development programmes. Multiple perspectives were considered for each group or participant and the interaction between them. On a daily basis events of interest would be noted within a log book through rapid, short notation, as they occurred in real time, this notation would then prompt a more detailed reflection as part of an event diary towards the end of the working day. The note taking was occasionally supported by the use of a voice recorder. Each event (point of interest) was logged, noting the information type being communicated, and the consequences of decisions made. Each of the events were coded into themes relating to the type of communication challenge. The frequency of these challenges could then be identified and presented graphically (see fig 7-1).

Individuals with a vested interest in the design outcome are discussed as stakeholders. In addition to users, consumers and manufacturers, the design practitioner is considered a product stakeholder discussed in terms of their decision making function i.e. Mechanical (DE), Hardware (HE) and so on. Please see table overleaf for practitioner titles and job function. Each practitioner remains anonymous.

The team of engineering designers under study comprised the following:-

**Table 7-1: Practitioner perspectives within the case study**

| | |
|---|---|
| Technical Director, | (TD) |
| Opto-Electronics Engineer | (OE) |
| Hardware Engineer | (HE) |
| Firmware Engineer | (FE) |
| Software Engineer | (SE) |
| PCB Design Engineer | (PE) |
| Mechanical Design Engineer | (DE) |

Whilst the practitioners/subjects were not aware of the study, consent was received retrospectively, prior to the inclusion of any results within this thesis. Prior consent was not deemed appropriate due to the likely detrimental effect on the results, participant's performance and the dynamics of the team. Where possible, language used to explain each event avoids technical terminology, to facilitate reader comprehension. Each event that supports a particular statement within this study has been shown in numerical superscript, where $^{x}$ represents the event number traceable to the event log (Appendix B).

## 7.4 Results & Discussion

The study identified that design information and instruction were poorly communicated to decision makers within the design process, often, incomplete, inconsistent, poorly timed and supplied in a less than adequate format. To a lesser or greater extent, the presence of these themes (figure 7-1) may be present within other design and OEM organisations and thus of interest to the wider design community which mostly adhere to a common process for new product development.

The documentation of decision making and communication was a challenge. The complex activity of design work was often documented graphically on the backs of envelopes and pads. It was observed that the layering of design activity in time was not clearly recognisable in space (i.e. through the note book pages). Whilst this proved to be a challenge; the case study approach embraced this evidently cyclic-sequential process of design and paid attention to these subtle details; partly due to the progressive acquisition of knowledge. Only key event types have been logged by way of support for the statements made within the discussion of this report. Each event documented within the appendices will have occurred on multiple occasions and has been selected for its pertinence and prevalence within the designing activity. Full examples can be traced back to the case study logbook diary.

**Figure 7-1: Opportunities for Improved Communication**

| THEME | SUMMARY | RELATED EVENTS |
|---|---|---|
| 1) INCOMPLETE COMMUNICATION | INCOMPLETE BRIEF AND PLAN<br><br>INDIVIDUAL TEAM MEMBERS DO NOT ALWAYS RECIEVE THE SAME INFORMATION | 1,2,3,4,7,8,9,12,13,14,15,16,18,20,22,23,24,26,27,28 |
| 2) INCONSISTENT COMMUNICATION | VARIABLE COMPREHENSION OF DESIRED OUTCOME<br><br>LIMITED AWARENESS OF INDIVIDUAL ENGINEERS CONCERNS | 2,4,6,8,9,13,14,15,18,22,23,24,26,27,28, |
| 3) COMMUNICATION FORMAT | LIMITED FORMAL REVIEWS AND DOCUMENTATION | 1,2,3,4,14,15,19,21,22,27,28 |
| 4) COMMUNICATION TIMING | LATE INFORMATION SUPPLIED | 7,8,9,13,15,20,22,24,26 |
| 5) COMMUNICATION LANGUAGE | VARIED LANGUAGE DUE TO DIFFERENT DISCIPLINES<br><br>DIFFICULTIES IN COMMUNICATING OVER LONG DISTANCES DUE TO TERMINOLOGY AND VISUALISATION ISSUES | 12,22,24,26 |
| 6) DESIGN PLANNING | NO PLAN ADJUSTMENT FOR PROJECT INTERUPTIONS | 1,4,5,11,19,20,21,22,28 |
| 7) DESIGN DECISION MAKING | DECISIONS MADE OFTEN IN ISOLATION WITHOUT CONTEXT | 1,2,9,13,15,20,22,23,24,25,26,27, |
| DESIGN DOCUMENTATION | LOG BOOK, E-MAIL AND POST IT NOTES | |

The above figure shows the themes identified within the study, documenting their frequency in terms of their associated events, presenting a graphical outcome of the most common themes.

The case study has identified areas of concern within the design process which support both the author's experience-based viewpoint and the current literature on new product development.
The themes identified within the study have been discussed below in relation to the events and issues highlighted within the study.

Themes relating directly to the identification and communication of user requirements (1, 2 and 5), respectively: incomplete communication, inconsistent communication and communication language barriers, have been discussed below, followed by more general issues of poor communication.

### 7.4.1 Incomplete communication

Far too often information provided to designers/decision makers was incomplete, failing to provide full and necessary details. This was by far the most common problem shown within the study and central to unnecessary costs within the development. It was clear that providing only part information led to assumptions and guesswork when filling in missing information [2, 9, 20, 24].

The supply of incomplete information can be a result of constraints arising from tight time scales where information is provided as soon as possible to get a project started and then supplemented as clearer goals are identified.[1, 8,9,20,23,24,26] Severe consequences were observed during the addition of a printed circuit board (PCB) [9, 20], the known, yet late addition of manual focus functionality and the addition of WiFi PCB [24] resulted in a re-design for the camera rear sub assembly and the camera's aluminium extruded body.

The common claim that information, specifically stakeholder expectations are provided too late within the designing process appears to remain. This study introduces a subtle addition to this claim that information is actually provided during the early stages, however, it is incomplete and often inconsistent [1, 8,9,20,23,24,26] this provides a clearer presentation of a potentially more harmful communication shortfall [9,20,24,26] where designers proceed at risk.

Additional support for these claims can be found within the following events:

Events 1-7 highlight the lack of any formal brief supplied to all team members.
Events 1-18 show no formal release of a design specification until 2 months after the project start date. The project plan received during event 4 was not updated for nine months, four months past the original proposed completion date, the project plan continued to show no revised completion date or revised milestones, whilst event 22; the first and only formally documented review, took place 8 months after the project start date. It should be noted that these issues extend beyond the objective concerns for product development into the general morale of decision makers, where unrealistic goal setting and poorly communicated information clearly affected design performance and the motivation of team members.

### 7.4.2 Inconsistent communication

The theme of inconsistent communication refers specifically to the concern that decision makers received different versions of the same information[9] In addition; decision makers had very little awareness of the effects of their decisions on other team members which is largely due to the lack of design reviews[22], formal briefs and updated project plans[4].

It would appear to be beneficial for decision makers to be constantly informing each other of their concerns, decisions and perceived consequences. However it cannot be assumed that simply considering the consequences of your decisions is enough; decision maker 1's perception of how his or her decisions may affect decision maker 2 will most probably differ from the actual consequences likely to occur. Decision maker 1 and 2 need to work in parallel as an on-going activity.

### 7.4.3 Communication language

When communicating a design problem and its brief[2], particular attention should be paid to the language and format used. The documentation of event 12 identifies how the mechanical housing for a thermal gasket was interpreted as the thermal gasket itself and not its housing. During manufacture this resulted in the gasket being made to the dimensions of its external housing due to a miscommunication. Both the gasket and the illuminator printed circuit board that sits on top of the gasket were dimensionally incorrect as a consequence.

The language used to communicate problems and their briefs within the design domain is understandably closely linked to its format where in some cases the format is the language i.e. sketches and metaphorical models. The manual focus, event 20, is an example where the format and language was a graphical representation of the solution not an expanded definition of the problem and this communication language or format discouraged the creative exploration of the problem, fundamental within any good design process.

One specific example, specific to language and terminology, is an e-mail from the project's Hardware Engineer involving a simple plastic shroud used to cover one of the light emitting diodes (LED) within the illuminator Printed Circuit Board (PCB). The Hardware Engineer requested the design for a coupler unit (because the cover couples the LED to a sensor) and the Mechanical Engineer made reference to the same item as the "Shroud". This event did not result in severe consequences however exemplifies the need for clear, agreed terminology at the

beginning of a project or, if necessary, as new items emerge, the language should be confirmed and agreed during the design activity to avoid unforeseen misunderstanding.

The need for a common language becomes increasingly important with respect to geographically dispersed design teams and their telephone conversations. When talking with home based decision makers (included within this study) difficulties arose in visualising over the telephone. Before any kind of meaningful discussion could begin each decision maker would need to make sure that the item visualised was the same for all parties, where for example, four legs and a high back could represent a chair or a giraffe.

### 7.4.4 Communication format

Both the format and the consistency of communication during product development are of equal importance. The language used to communicate and the timing of its delivery are an important contributor to clear understanding[20, 2].

The study presented a clear example of how the design brief[2] may contain statements that begin to influence and blinker the outlook of the designer/decision maker. It is recognised that part of a design brief's very function is to begin the creative thought process with a certain level of specificity and context. However, the brief generator must be cautious not to impose strong creatively limiting views at this early stage.

Moving beyond delivery of the brief a lack of formal reviews[22] were replaced by the important, although not sufficient, 'corridor conversations'[14] which provided a false sense of ongoing communication and team working. The quality of this ongoing communication was not sufficient due again, to the lack of documentation and concurrent vision. This in turn resulted in reduced awareness of the common issues collectively faced by the design team, lacking any measurable effects or consequences that each new task or expansion may have upon the progress of the project. With no documented minutes and measurable stages of advancement, this form of ongoing communication proved to be important, however not sufficient as the only means of information sharing. The communication strategy failed to provide a central reference point making each decision maker aware of each team members' concerns towards the key points under discussion.

Event 21 a late requirement for manual focus, provides a typical example of 'feature creep', a post it note sketch was offered with a solution for manual focus as the design brief rather than the problem to be solved. These sub briefs are often communicated via a post-it note sketch of potential solutions rather than an outline of the problem, exemplified by this late request. The

sketch for the manual focus showed itemised components that were then highlighted within a catalogue of parts showing order numbers for each item. There was no written brief, no opportunity for exploration; simply a schematic of how the item should be designed and a list of parts that could be ordered to achieve the 'post-it note' design.

After following the instructions the design did not work and the design process was time consuming, and costly. The need for manual focus was successfully implemented through later group discussion between the OE, DE, and TD. It could be argued that the design practitioner in receipt of the brief should push for the exploration of alternative ideas and should work towards the best solution not the solution prescribed within the brief. However, in reality, senior members of staff, team leaders and directors often provide the brief, were resistance to deviations from the original idea proposal is not uncommon.

The practitioner should work to a strong process of reasoning and be able to justify each decision and deviation from the original brief. It should be recognised that these solution led 'post-it note' design briefs also limit the practitioners' apparent freedom to provide alternative solutions due to the lack of any budgetary, manufacturing volume and timescale data provided. The negative effects are compounded by the failure to update the project plan for the addition of new features. Whilst this may be considered as ultimate freedom from budgets and time constraints, in a competitive product development environment form inevitably follows time and budgetary restrictions. This does not mean the designer is prohibited from being creative, in actual fact; the result is quite the opposite; when a designer feels they have reached their creative potential that is often the point at which they become truly creative, as they begin to pursue less conventional solutions.

It should be recognised that the essence behind the 'post-it note' brief is certainly valid where quick graphical communication is appropriate as supposed to a formal written brief for each added design feature which is often not practical. There is evidently[21] a need to address the format of brief communication at both the beginning and throughout the product development cycle with particular attention paid towards the problems of 'feature creep'.

After the formal design review[22] a clear concern was recognised by the TD that many issues with the design remained unresolved. This was the group's first formal review and enabled the catchment of outstanding design issues. The review further demonstrated its value in provoking a sense of improvement in future communication between all design team members[23].

### 7.4.5 Communication timing

The communication timing to either inform, or start, design work was a main theme identified within the study[24, 9, 20]

Information provided during the early stages[2] supplemented at a later date resulted in project delays and component re-design (Note: this was not due to the inevitable discovery of information previously unavailable during the brief compilation stages) [20, 13, 24,9,20]. It is unreasonable to expect designers to embark upon their design 'journey' (Watson, 2005) without the full design itinerary/brief, only to then be provided with additional information and/or requests for functionality after the design process has begun. Although there are times when this cannot be avoided, care and attention must be paid to these issues during the early stages of design.

Poorly timed and inconsistent communication fed to individual engineers resulted in a lack of awareness among the engineering practitioners of their own and each other's individual requirements. This resulted in the non recoverable collision of mechanical and electronic components which led to a total re-design, two months into the development programme. The prototype assembly machined from solid aircraft aluminium was scrapped[13], an error which could have been easily prevented through regular reviews.

### 7.4.6 Design planning

A plan must be recognised as an ongoing and living part of any project due to the very nature of what it is trying to manage and the likelihood of sudden change. The plan should be flexible and regularly reviewed and updated ensuring targets are met with milestones that motivate not dishearten.

Although this project was under development during a particularly busy time for the design firm that ran multiple projects in parallel, failure to update the plan[5, 19,20,22,28] throughout the life of a project is wholly negative on the efficiency of the design process. From the introduction of a new project manager (PM) on 08/06/2005 there was an improvement. The design team had periodic design meetings and reviews for the allocation of work. The evidence suggests this gave a much improved sense of ongoing communication and started to progress the project. A new project plan was also introduced, although, this was not updated for the remainder of the project.

### 7.4.7 Design decision-making

The lack of regular design reviews resulted in a failure to adhere to decisions and a failure to document, or in some cases, remember the agreed course of action, to the extent that whole products where subject to redesign[13]. To enable good design, decision makers must receive all available information before setting off on the 'design journey'.

Most themes identified are founded upon and, interlaced with the concern of poorly timed and incomplete information. A particular example that resulted in considerable design modification to the rear cover of the camera and the camera body was the need for easy sim-card access. The camera is a wireless design that can be accessed over the internet. The requirement for easy sim-card access was highlighted after the design activity had already begun. The sim-card holder was located above the power supply within the camera but required regular easy access due to the difficulties experienced by assembly staff for previous camera designs; on previous occasions they found it difficult to install sim cards, which in some cases resulted in camera failure[9].

Poor decisions appeared to be more closely associated with poor timing rather than being incorrect[20] The additional feature for manual focus resulted in the prototype camera being sent back to the manufacturer for modification. The need for this feature should have been highlighted earlier and is a good example of a poorly timed, poorly communicated and poorly implemented solution.

After the group's first formal review there was a sensed feeling of improved communication and the decision making during the design activity became more informed and considerate towards other team members needs and requirements. This was attributed to the evident increase in telephone and e-mail conversations amongst decision makers[22].
Within design, there is the temptation to continue updating and changing a product to improve its performance. At some point it must be decided and agreed that the design is within the specification and ready for release into manufacture. The camera design was submitted for quotation[25] too early: Whilst approximate costs offer a good guideline for design if these quotations are received too early the quotation provided may be incorrect and also provide a false sense of time scales for manufacturers.

The manufacturer often received little communication regarding the project and was then still expected to respond rapidly to what invariably became an urgent requirement. These urgent requests appeared to follow on from previous requests of similar urgency for components that were then not used or shipped[29]. This type of supplier management does not work towards

building trust with manufacturers who are expected to deliver to short time frames and may be disheartened particularly after previous efforts during the first prototype manufacture were left un-attended for 4 months[11].

It became clear that sharing views and seeking to appreciate the consequences of each decision made was fundamental. The study highlighted an event[27] where a consulting engineer (HE) was reluctant to take note of other engineers' views during his decision-making for the design of the power supply PCB. Through ongoing dialogue this short fall was recognised after much debate and resulted in a more cost effective, lighter and easily assembled design[28].

### 7.4.8 Design documentation

There was a lack of documented decision making which will remain a challenge particularly when 'corridor-conversations' are standard practice and there are limited reviews. There was one example[28] where the DE had forgotten that the PE required a particular area of PCB to remain free from metal contact. This agreed item was forgotten due to no formal documentation and the sole reliance upon memory. Whilst the individual designers should take a record of these agreements, with so many decisions and parallel projects at any one point in time this remains a challenge. It would be beneficial for these notes or agreements to reside in an accessible format to multiple team members; the individual engineers' log books may not always be available and can be difficult to interpret due to the individual short-hand and the issue of layered sketching.

## 7.5 Conclusions

The seven themes identified within the study offer a strong foundation for the future development of how best to communicate throughout the design lifecycle. The themes, to a greater or lesser extent may offer a gentle reminder for the wider design community, brief generators and decision makers within the product development process, of the likely pitfalls and areas in need of continuous attention.

The case study offers a grounded outcome upon which future requirements-capture and communication might be based, seeking to ensure that the necessary information and design requirements are not only provided during the early stages of the design process but that the information is as complete and clear as possible, presented in a format readily integrated at every stage of the design work. The themes have been tabulated over leaf as an early foundation upon which to build future governance.

It is apparent from the study that a lack of timely communication and clear user requirements resulted in much time delay, additional unforeseen costs, reduced practitioner performance and a general reduction in the morale of the engineering team and decision makers. Unrealistic goal setting and poorly communicated information clearly affected design performance and the motivation of team members. Furthermore, the inconsistent requirements provided to members of the team resulted in a lack of awareness relating to their own and the individual requirements of other members within the team; where individual engineers were only aware of part of the overall requirement. In one instance this resulted in the non recoverable collision of mechanical and electronic components which led to a total re-design, two months into the development programme. The prototype assembly machined from solid aircraft aluminium was scrapped; this could have been easily prevented through the clear communication of requirements.

The study showed that communication was often incomplete and poorly timed, forcing designers to proceed at risk incurring financial penalties, placing further emphasis on the importance of clearly identifying and effectively communicating user requirements.

**Table 7-1: Proposed governance to address problematic communication within design teams**

## The Identification and Communication of User Requirements:-

- The design team should receive the same requirements brief. If specific tailoring is required the context of specific requirements in relation to their peers should be made clear
- To ensure that all designers have access to a common set of requirements

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- Designers must receive a complete requirements brief not incomplete or in a piece meal format

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- Need to provide a consistent communication format that can be reviewed regularly during design workshops and gate reviews
- Where possible use a common language understood by all

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- Present the requirements brief in the context of the entire engineering programme to assist project prioritisation

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- Consider a universally accessible documentation system for notes, sketches, email and workshops accessed by all stakeholders.

## General Issues Relating to Communication Performance:-

- Where necessary agree terminology
- When introducing new features present the brief as an opportunity not a solution and consider dependencies (ensure designers are sufficiently briefed in a format that promotes creativity).

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- Bring geographically dispersed teams closer through technology
- Support face to face working or teleconferencing
- Share decisions with other stakeholders to consider the implications of decisions

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- Ensure a coherent comprehension of the desired outcome
- Provide the opportunity for designers to discuss and clarify their comprehension

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- Decisions should be made with consideration to the local and global context and all stakeholders
- Document decisions made and the required action

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- Must make team members aware of other team members concerns or requirements
- Support an environment where implications of decisions and dependencies are clear

# 8.0 Designing for Emotion: The Tools

## 8.1 Introduction

A collection of over 30 pleasure based design tools have been subjected to a desktop review, evaluated against seven criteria: described within the methods section of this chapter, relating to their ability to effectively translate insight into requirements through the communication life cycle within the design process. The tools were categorised based on their dominant bias towards the collection, interpretation, communication or integration of consumer insight. The categorised tools were then analysed in terms of their strengths, weaknesses and opportunities for improvement. This analytical approach elicited the key concepts of governance contained within the body of tools to highlight the desirable attributes future U/CI communication tools should possess, as part of a wider systems approach to offer a comprehensive governance framework for the output of ethnographic work in design.

This review is positioned to contribute towards a governance framework for the future communication of U/CI to design teams as part of a multisource approach for governance.

Whilst the tools have been categorised in this way, the flow of consumer insight into, and around, the tool and the preceding and following phases for the given tool were also explored, to enrich and contribute towards the identification of interpretation, communication and integration methods surrounding pleasure based design tools. The research study is founded upon a communication-led perspective of the design process (see figure 4-2). Each tool has been briefly summarised followed by a tabulated analysis of the strengths and weaknesses arising from each tool category [appendices, C part 1, 2 and 3].

### 8.1.1 Aim

Contribute towards a governance framework for the future communication of user/consumer insight (U/CI) to design teams, as part of a wider systems approach to a comprehensive governance framework for the output of ethnographic work in design.

### 8.1.2 Objectives

- Identify the available pleasure based design tools and collectively explore their apparent strengths and opportunities for improvement.

- Categorise the emergent themes arising from the tools strengths and weaknesses to offer governance for the communication of U/CI to design teams.

## 8.2 Method

The overall research programme adheres to a systems approach as the guiding framework to encapsulate and guide the research; complex and trandisciplinary in nature, drawing on different sources of data in accordance with the research strategy discussed within chapter 2.0.

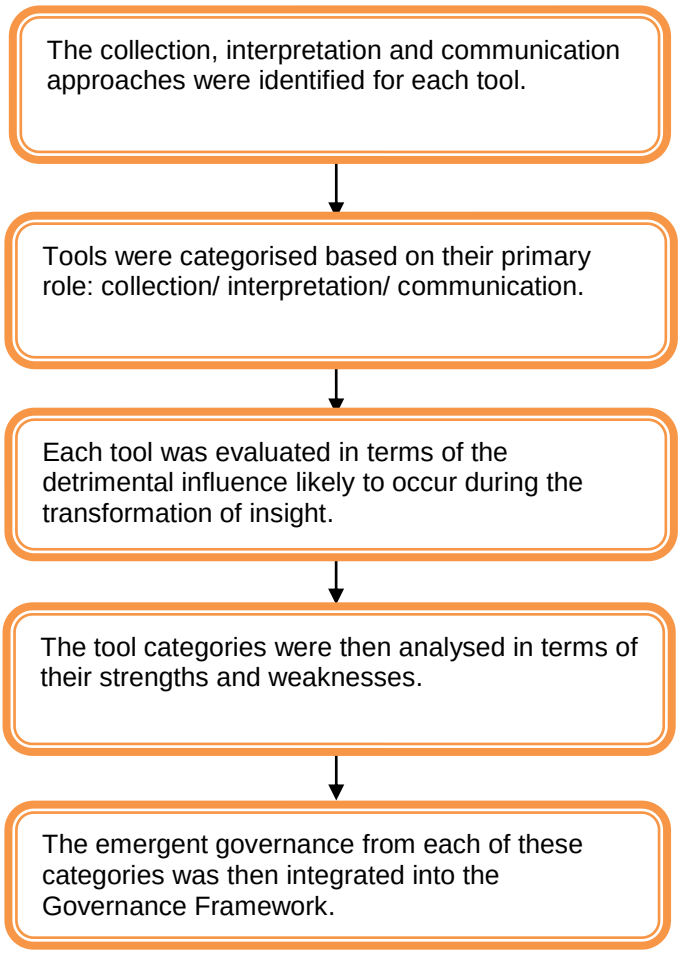
In the first instance, each of the pleasure based design tools were evaluated against seven different performance criteria, listed below, to assess the varying levels of detrimental influence at each stage of requirements transfer between stakeholders, at their various stages within the design process (figure 4-2). The detrimental influence relates to the loss of clarity and truth from origin, to the point at which the insight is transformed into a design solution.

The intention for a communication led design process is one that elicits the overt and latent consumer requirements to then successfully transform the requirements into a design solution, intact and in accordance with the user/consumer expectations. At each junction within the process there is a risk of losing data and clarity for the captured requirements: these requirements may become lost in translation, with diminished quality and clarity to then yield a level of detrimental influence. The extent of this detrimental influence was given a grade from 1-5, were 1 = low influence and 5 = high influence. Each of the tools received their own grade for each of the criteria listed below. These criteria reflect the junctions of handover during the collection and communication of requirements throughout the requirements capture and integration process.

- U/CI influenced by person or context being studied i.e. likely behaviour change
- influenced by collector
- influenced by interpreter
- influenced by communicator
- influenced by communication format
- influenced by interpreter
- Influenced by integrator

After the initial evaluation each of the tools were then categorised as either, primarily, a collection, interpretation or communication based tool. The strengths, weaknesses and opportunities for each category could then be identified as a contribution towards a governance framework for the communication of user/consumer insight (U/CI) to design teams, towards providing a greater understanding of how the output of ethnographic work in design may be further developed.

**Figure 8-1: Tool Review: Research Method Flow Diagram**



## 8.3 Results & Discussion

The most relevant tools within the review have been summarised below; these are the tools believed to offer the greatest contribution to a governance framework with respect to the way in which they collect interpret and communicate U/CI. Whilst certain tools will primarily focus on the collection or use of U/CI the study has sought to identify how the tools operate during these three stages of the design process even though these stages may not be the main focus of a given tool. This approach offers a greater breadth and depth to understand how consumer insight is managed when designing for emotion.

The tools have been briefly described and then later discussed in terms of their affiliation towards a particular collection, interpretation or communication approach

### 8.3.1 Collection Tools

#### 8.3.1.2 Cultural Probes (Tool Approach Number 1)

Cultural Probes (Gaver, Dunne, and Pacenti, 1999) are used to collect data that explores the social and cultural issues and values that underpin a particular consumer group. There is no right or wrong answer, the data collected and they way in which that data is generated by participants of the study in itself can be of much use to the design activity. Cultural Probes can be applied to a diverse population of consumers and utilise an indirect self reporting approach. Completed by the participants, Cultural Probes can include question cards, disposable cameras, diaries and maps to show their location. Participants can be encouraged to take photographs or diarise particular events and objects that are significant within their lives. Tasks within the research are completed by participants without intervention from the researcher.

#### 8.3.1.3 Inspiration & Assessment Cards (Tool Approach Number 2)

IA Cards (Hummels, 2004) are used to facilitate conversation using various image cards to encourage discussion at a more personal and creative level, bridging the gap between the sensorial world of Cultural Probes and Interviews.

#### 8.3.1.4 SEGIT (Tool Approach Number 3)

SEGIT (Tomico, 2006) is used to assess the user experience to guide and inform the design process in contribution to the product specification. The SEGIT method uses a Repertory Grid Technique to assess user experiences with existing products and transform those experiences into analogies. The process comprises an interview, experience analogies generation and

experience scenario building, exploration, projection and scenario generation respectively. The approach appears to identify the experiences of users with one particular product, and project these experiences as guidance to inform the development of new products by building a user scenario around the desirable and not so desirable features of the new product.

### 8.3.1.5 Archetypes Discoveries (Tool Approach Number 4)

As with many of the tools Archetypes (Rapaille, 2006) are used to identify consumers' core issues, attitudes, behaviours and motivation, addressing the gap between what is said and done. It is proposed that this challenge can be met through a combination of biology, cultural anthropology, psychology and learning theories to explore consumer reactions to products and services. Essentially participants take part in 3 focus group sessions. In session 1 they talk about feelings and ideas that participants have about a particular product or service, during the second session the research team specifically look for patterns within the dialogue to identify the core problem the participants are asked to discuss the product and offer stories associated with and around the perceived problematic situation or area for change. The Archetype research team at this stage believe the unconscious thoughts towards a particular product or service surface at this stage. The third stage verifies key findings, words and themes found within the discussions and stories provided by the participants. The Archetype's added value appears to reside in the biology, cultural anthropology psychology and learning theories applied to the interpretation of the participants' stories. The specific use of these techniques and disciplines are not openly shared.

### 8.3.1.6 Body Storming (Tool Approach Number 5)

Body Storming is a rapid way to gain sensorial, ergonomic and psychological comfort information. Body Storming uses role play with or without props to explore and act out a situation through the role play (Buchenau and Suri, 2000)

### 8.3.1.7 RGT Repertory Grid Technique (RGT / Tool Approach Number 6)

RGT is underpinned by Personal Construct Theory to provide a nomothetic measure of target group personality: see Fallman and Waterworth (2010) for an example .RGT enables and encourages participants to create their own constructs for a particular topic. Exploring peoples perceptions through their own bipolar constructs of the context under investigation. Constructs within RGT are the result of a triangulated trade off between three phenomenon identified by the participant to offer a single meaning, for example one product might use recycled material and the other two may not. We then have a single construct of sustainable versus non sustainable which perhaps emerge from three pre-constructs as 'modern materials' Construct elicitation is about distilling the constructs as a reference against each other in terms of what uniquely defines

the topic area and can be discussed in bipolar terms. Whilst the topic as an area of inquiry is defined by the researcher the constructs or elements within the topic are created by the participant and assigned a bipolar likert type scale to measure the construct e.g. good versus bad. The selected constructs should be the most prominent ingredients or elements within the topic. The constructs are then discussed usually in threes to differentiate one construct from the other two as emergent themes bring about a more concise construct to be measured. The application of RGT is wide and varied, within the design domain; applications may include the evaluation of design sketches or prototypes with other existing products. One of the major strengths of RGT is that participants create the constructs themselves rather than the researcher.

#### 8.3.1.8 Design Movement (Tool Approach Number 7)

In Design Movement (DM) product design is viewed as not only the design of artefacts, systems and services but the design of movement and interaction a type of interaction choreography brought about by design (Klooster, 2007). In DM the 'dance' or a desired movement is used to lead the product development and the characteristics of the product to deliver that movement.

#### 8.3.1.9 Interaction Re-labelling (Tool Approach Number 8)

This method is concerned with the disassociation of form, interaction and function, which ultimately build on each other and increasingly designed independently need to be reacquainted (Djajadiningrat, Gaver, and Frens, 2000).Furthermore there are accepted norms of how particular products should look, feel, be interacted with and what function they perform. Interaction Re-labelling seeks to take an inspirational non related product and role play around the inspirational product as the designed artefact labelling the features and details of the product to explain how it might work. This approach seeks to expose the assumptions of form, interaction and function and place greater emphasis on challenging these assumptions and the glue between what should be three very interdependent constructs of the designed product. This approach not only encourages incremental change but also provides a landscape against which more creative step changes become possible.

#### 8.3.1.10 Physical Fusion Design (Tool Approach Number 10)

Physical Fusion Design, (Hummels, Aadjan, Helm and Klooster, 2007) incorporates Design Movement, Interaction Relabelling, Tinkering, Play-Acting and Interactive Tangible Sketching & prototyping using sensor technology and dataflow modelling programmes and physical modelling. The combined tool set promotes early stage 3D prototype sketches to facilitate user experience and interaction design. The design teams and researchers start with keywords that enable them

to describe the overall experience they hope to create. Through Design Movement the overall experience can be explored. The design movements are translated into a sketch model as a projection of the movements using various props materials and the environment. introducing sensor flow technology and data flow modelling programmes the tangible 3D sketches are made more interactive and dynamic.

### 8.3.1.11 Vision in Product Design (Tool Approach Number 11)

Vision in Product Design (ViP), is designed to generate innovative ideas by addressing what is possible rather than simply what is wrong. In contrast to the tight constraints of an existing product line, market demand and incremental change to fundamentally what already exists, ViP promotes radical innovation by deconstructing a problem or proposed conceptual solution back to its context (the problematic situation) to then develop innovations for that setting not to simply implement a predefined solution. See Hekkert, Mostert and Stompff,(2003) as an example.

### 8.3.1.12 Focus Group (Tool Approach Number 12)

Focus Groups are ordinarily a collection of people brought together to discuss a particular topic. The aim is to elicit peoples motivations, feelings and experiences towards a particular subject area, problem or product to be evaluated (Bruseberg and McDonagh-Philp, 2002). The group relies on a unique dynamic among participants that generate and bounce ideas and share experiences with each other. This emergent approach often results in diverse and sometimes unexpected courses of inquiry, although beneficial for the broader context this can be a challenge for the facilitator to manage. Furthermore, this emergent property arising through the interaction of participants can also bias participants' comments and involvement within the group. Data gathered during the session can be coded and categorised into themes to guide the development of new products.

### 8.3.1.13 Self Reporting Methods (Tool Approach Number 16)

Self Reporting is a reflective perspectival inquiry into one's own mind, situation and context. Documenting our own experiences through a combination of media comprising dictation, photographs, video diaries and other note taking. (Hughes et al. 1992) Whilst these approaches may be quick and accessible to most design researchers, the need to be true to oneself is demanding and paramount to arriving at any useable outcome. This type of exposure promotes great empathy for designers however the designer is not necessarily the typical user.

#### 8.3.1.14 Direct Consumer Self Reporting (Tool Approach Number 17)

Direct consumer self reporting is similar to self reporting but carried out by the consumer, similar to Cultural Probes (Gaver, Dunne, and Pacenti, 1999), a direct consumer self reporting approach is often conducted within the naturalistic setting of the consumer's native environment; however, the inquiry is self guided with only a loose framework for them to follow. This approach can show what the consumers themselves see as being important without a predefined direction from any researcher involvement. The tools used to document the experiences, values and aspirations again would not be dissimilar to that of Cultural Probes. Furthermore, the outcome can contribute to a Repertory Grid or further indirect exploration (Fallman and Waterworth, 2010)

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#### 8.3.1.15 Direct Ethnographer Self Reporting (Tool Approach Number 18)

Direct ethnographer self reporting is similar to direct consumer self reporting, however the addition of a trained ethnographer would go some way to ensure a non bias participatory and reflexive inquiry (Hughes et al. 2000).

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#### 8.3.1.16 Ethnography (Tool Approach Number 19)

Ethnography is a reflexive, perspectival inquiry conducted within a naturalistic setting to explore sociocultural phenomenon (Hughes et al. 1992). The ethnographer is trained to watch inquire and participate within the context and or problematic situation to report rich yet objective descriptions of events, values and aspirations and the tools and methods used within the social group to make sense of and adapt to their world, eliciting the underlying logic of their social practice.

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#### 8.3.1.17 Observational Inquiry (Tool Approach Number 20)

Observational Inquiry is often referred to as Scenic Ethnography, free from any participation, inquiry or analytical component. (Forsythe, 1989)

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#### 8.3.1.18 Exploring (Tool Approach Number 21)

Exploring is similar to Ethnography; However, the subject is often unaware of any observation or analysis of the relationship (Thompson, 2006). This could be referred to as a form or real time reflection. Whilst actively seeking out individuals and contexts to explore without their knowledge, to actively reflect during the activities of your own life is of course a healthy activity. However there will be the inevitable pre conceptions and emotional valence that comes with such an approach.

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### 8.3.2 Communication Tools

#### 8.3.2.1 Affectvisualisation (Tool Approach Number 22)

There is very little information regarding this tool, which appears to be an excel based programme. Affectvisualisation is capable of taking a series of semantic differentials and presenting them in a combination of graphical outputs to ease interpretation by the design practitioner (Barnes, Goudler and Lillford, 2007). These formats do not necessarily appear to be novel in their display, comprising 2D and radar plots and a response distribution among participants to outline how many participants across the range share a particular view.

#### 8.3.2.2 Context Mapping Tool Suite (Tool Approach Number 23)

The Context Mapping Tool Suit is a tool for the communication of ethnographical works to designers (Sleeswijk Visser, Jan Stappers, Van Der Lugt and Sanders, 2005). The mapping tool creates a sketch of the experiential context of product use. The map is open to designers, researchers and consumer/participants as a shared visual tool to encourage creativity and discussion among the team. The map shows a scene or scenario and the results of the exploration are presented as a visual-verbal summary to be used by designers.

#### 8.3.2.3 Extreme Characters (Tool Approach Number 24)

Scenario and Persona building are very much common place within the design domain. Often these personas can be very detailed in describing lifestyle but place little emphasis on the characters emotional disposition. The creators of Extreme Characters argue that the creation of an extreme person; almost a caricature of the target market promotes these emotional traits present within individuals that are often not accounted for within the design process, exaggerating these emotional attitudes brings these otherwise hidden traits to the foreground as they may ordinarily be considered anti social (Djajadiningrat, Gaver, and Frens, 2000).Designing for the standard persona; an emotionally muted individual, limits the design activity to address only the traits recognised as socially and culturally acceptable.

#### 8.3.2.4 Mood Matrix (Tool Approach Number 25)

A Mood Matrix is a portal to visually demonstrate through various images, photographic or others to create a series of mood boards that represent the three major emotions a product seeks to facilitate or evoke (Red, 2007). All stakeholders within the product/business including users should explore and discuss the emotional aspects of the target market. The Mood Matrix method encourages a maximum of three ‘emotions’ to be selected and ranked in order of priority. The

Mood Matrix provides a source of inspiration to the design team and an ongoing reference or consumer voice for the users emotional requirement within the product.

### 8.3.2.5 Personas (Tool Approach Number 26)

Personas are a method to bring a consumer group to life for the design team (Blomquist and Arvola, 2002). Generated from research into the market and the individual consumers a fictitious character can be described including behaviour goals, aspirations and values. Each Persona can be developed over time as the design team and researchers become more immersed into the context of use. The Persona becomes a universal reference point against which the design can be reviewed, measured and assessed.

### 8.3.2.6 RealPeople (Tool Approach Number 27)

RealPeople is a DVD based 'resource' for designers; it is designed to inspire and inform the designer in the early stages of the design process; highlighting the key 'pleasure' needs of the target market and promoting greater empathy with the user (Porter, Chhibber, Porter, and Healey, 2005) A format easily accessible to them with respect to their background and current working practices. The DVD highlights the key pleasure needs of the target market to promote greater empathy with the user.

### 8.3.2.7 Scenario Building (Tool Approach Number 28)

Scenario Building supports early stage insight into the background, context, values, lifestyles and how people perform particular tasks (Suri and Marsh, 2000) Whilst Personas may include reference to context, Scenario building places a greater emphasis on the context of product use and the problematic situation. Typically ergonomists provide guidance specific to usability and functional aspects of performance. However there is and has been for some time now a demand to involve human factors specialists at the earliest stages within the design process to support and represent not only the usability and practicality issues of product use but also lifestyle and product appeal or affect on the more emotional aspects of the design

### 8.3.2.8 Product and Emotion Navigator (Tool Approach Number 29)

The Product and Emotion Navigator (Desmet and Hekkert, 2002), is a database of product images, the emotions evoked by them for particular users and the self reported reasons behind the experienced emotion from the users perspective. The tool seeks to highlight patterns of conditions that elicit various types of emotion through the database of personal examples. The tool can be used as an inspiration and discussion point for design teams during the early stages of the design process.

#### 8.3.2.9 Image Board (Tool Approach Number 30)

Image boards are a non verbal way to communicate a particular mood, atmosphere or meaning to be incorporated within a product (McDonagh, Bruseberg and Haslam, 2002).The Image Board can also be used to communicate the type of reliability, function, movement, cultural messages and technical complexity of a product. Typically they are used to focus on the more emotional aspects of the design. The Image Board can be used during the early stages of the design process and also as a point of reference and evaluation during the design activity. Image boards can be created easily with any images or materials collected by both designers and researchers. Involvement from the target users also adds another dimension and discussion opportunity for the team.

#### 8.3.2.10 KESo (Tool Approach Number 31)

KESo is a Kansei Engineering software based tool that enables users to review and input their feelings towards a particular product using semantic differential scales (Schutte, 2007). The generated web based pages/portal use predefined Kansei Engineering words and product properties. Once sufficient data has been gathered for analysis the software connects Kansei words to product properties. The tool creators claim the software creates a 'prediction model' "which can be used in order to optimize the product layout in a way that a certain feeling is evoked by its appearance or behaviour"

#### 8.3.2.11 Kn6 IBV (Tool Approach Number 32)

Kn6 IBV (IBV, 2007) is a set of software tools that help manage information collected from the Kansei Engineering approach to user oriented products. The database includes Kansei words, design elements, products and users to manage the results from the Kansei evaluation. The software comprises three modules 1. Data base management 2. Profile generator 3. Design. The profile generator displays the image communicated by the products under evaluation from the users' perspective through the Kansei Engineering framework whilst the design module shows connections between user perception and design features.

### 8.3.3 Integration Tools

#### 8.3.3.1 Product Attachment Scale (Tool Approach Number 34)

The Product Attachment Scale is used to support designers in creating emotional bonds between products and users by being able to quantify the degree of product attachment experienced by users to a product during ownership (Mugge, 2007). The PAS tool asks users to grade their own levels of attachment to a particular product. The PAS tool provides not only inspiration for design but also as a discussion point for the design team, researchers and users.

## 8.4 Dominant Approaches for U/CI Collection, Interpretation and Communication

The quality of captured consumer insight and its reliable communication to design teams are both fundamental when designing for consumer pleasure and ultimately, loyalty. The journey of the captured insight through the stages of the CINCIERE model (figure 4-2) and multiple stakeholders must remain intact and true. Whilst any quest for truth and knowledge is not without philosophical challenges, the avoidance of detrimental influence can be reduced. Exploring the pleasure based design tools: how consumer insight is currently captured by them or for their use, and how the data are interpreted and communicated to design teams has enabled a series of opportunities to emerge for this early stage of the design activity.

As a result of this evaluation, a part contribution towards a governance framework for consumer insight capture and communication has been presented. The analysis focused on the three key categories discussed here; Collection, Interpretation and Communication.

### 8.4.1 U/CI Collection

Indirect self-reporting, direct self-reporting, and contextual inquiry; such as scenic ethnography, full ethnography and role play whilst not forgetting focus groups, interview, and questionnaire methods emerged as the most common approaches when collecting U/CI for use within the pleasure based design tools.

#### 8.4.1.2 Indirect/Direct Self Reporting

Indirect self-reporting for tools 1, 2, 8, and 10 appeared to rely on an approach that enables the subject to express themselves through seemingly unrelated activities. These expressions start to tell a story to the design researcher. The consumer or participant makes comments about an object or artefact that may be un-related to the design but will infer other traits or characteristics as a means of indirect self reporting. Indirect methods of inquiry offer an opportunity to reduce narrational dissonance, allowing the discussion of related but not directly associated topics to reveal the preferences of consumers. Indirect methods may be considered a truth finder approach to identify consumer aspirations and social conformance to reduce, in part, the problems arising from narrational dissonance.

An example might be when designing a new range of cutlery, to talk about favourite restaurants or food, opposed to directly discussing cutlery; The researcher would have to take into consideration that restaurant types might be something the consumer would seek to impress with; however, starting the inquiry with food type and then favourite restaurants is one possible example: the consumer talks about non related issues revealing hidden preferences.

Whilst these indirect methods seek to reveal hidden aspirations, the consumer will of course be influenced by the very action of performing the task and may seek to provide a contribution to please the design researcher, rather than true aspirations or requirements. This indirect story telling enables the interpreter to make inferences about the subject and also provide some idea of how the consumer would like to be perceived communicating a combination of who they are and who they would like to be. This may actually be of more value to the designer particularly when creating more hedonic and aspirational products. There was little emphasis on the interpretation and communication method for this approach, other than the collected media, such as photos of restaurants.

Almost all research techniques can be made indirect by discussing linked topics or areas that may offer a more holistic user profile considering their values, aspirations and sociocultural templates. Indirect self-reporting can be as time consuming or quick as one chooses to make it; either using cultural probes, image boards or short and concise interviews. Time for the collector can be kept to a minimum due to the self-reporting nature of inquiry. This may however, result in a more time consuming interpretation stage with potential need for specialist psychological training.

Methods that are predominantly used for direct reporting; focus groups 4, 12, 25 interviews and questionnaires 15, 13,14, 22, 27, 31,32, 34, can all be used as indirect methods. A repertory grid and bipolar scales can be created using the emergent constructs from the consumer's contribution or description, which may highlight previously overlooked or latent consumer wishes and aspirations.

In most situations both indirect and direct self-reporting enables multiple subjects to build their story in their own time and space with take home exercises. A large audience can be targeted because the researcher doesn't need to be involved during the collection process resulting in a lower resource requirement (potentially more exhaustive during interpretation) whilst making the task more enjoyable for each subject; this may also increase the likelihood of completion.

### 8.4.1.3 Contextual Inquiry

Contextual inquiry methods 19, 20, 21, 23, 26 and 28 offer a rich source of data providing background information to a person's behaviour and the likely causes of that behaviour. It is important that contextual inquiry methods are used with the greatest sensitivity so as not to disturb the context under study. The very nature of probing a context can have a significant effect on the results. This type of U/CI Collection involves the following approaches 1. Watch 2. Inquire 3. Participate.

Among the tools reviewed little information or guidance had been provided regarding the interpretation and communication of U/CI data. All collection methods face the challenge of narrational dissonance; a type of storytelling and disparate representation of a particular setting through what an individual says, does and thinks. Each researcher should seek to contain the issue through well-considered interpretation and communication methods.

## 8.4.2 U/CI Interpretation at Source

No emphasis has been placed on the interpretation of U/CI. There appear to be little to no rules within the tool set regarding the interpretation other than to employ the skills and experience of a trained interviewer or focus group facilitator qualified in the area of psychological theory.

Often the self-directed interpretation appears to be left to the designer with little guidance or few rules to follow. Many of the tools indicate the need for sound psychological theory to interpret U/CI results but pay little attention to the criteria and importance of the interpretation.

## 8.4.3 U/CI Communication to Design Teams

Various communication formats have been adopted by the pleasure based design tools. These include video footage, 12, 19 and 27 scenarios, 28 personas, 26 image boards, 2, 29 and 30 graphical representation, 22 repertory grid techniques, 3 and 6 visual flash cards 2 and other self-directed formats selected by the communicator. The various communication formats with the perceived minimum detrimental influence typically comprise contextually rich data such as real life video and participatory design techniques, providing a deep understanding of the product user. These are typically time consuming and expensive to carry out.

Central communication hubs, where the U/CI is entered directly into the communication tool and displayed to the Designer using that same tool and format, are a useful approach, such as

consumer defined bipolar scales. All the communication methods listed above rely on an element of story telling and risk embellishment before reaching the designer.

It was identified that many tools 4, 10, 11, 13, 14, 16, 17, 18, 20, 21, 24, 25 and 33 did not have any formalised guidelines for the communication of U/CI to design teams.

### 8.4.4 Interpretation as Recipient

The interpretation of communicated U/CI post collection appeared to be predominantly interpreted by the design practitioner. The designers are expected to interpret increasingly complex contextual data detailing experiences that they may or may never have. The limited interpretation techniques available to the designer often extend beyond their expertise; calling for a new breed of design researchers / ethnographers.

When the designer is in fact a member of the target market the detrimental influence can be greatly reduced thus presenting a real argument for participatory design or ethnographical techniques that involve the designer. However, we must remember that designers are not typical users and all people can be subjected to the story telling of their own lives whilst seeking to make sense of, and justify, their actions. Furthermore, participatory design has been identified as time consuming and costly when compared to other techniques performed by an independent researcher.

The interpretation of U/CI from source can be carried out by the design practitioner or a professional researcher prior to communicating with the designer. It was identified that the vast majority of tools did not have any formalised guidelines for the interpretation (1, 5, 6, 11, 13-21, 23-30,33, and 34). Tools 22, 31 & 32 rely on graphical methods to interpret and analyse their result, whilst tools 2, 3, 4 & 12 used trained interpreters such as a professional ethnographer or psychologist. Unable to comment on the self-directed methods the tool analysis reviewed the possible combinations and stages where interpretation could take place and the likely implications.

### 8.4.5 U/CI Integration

The effectiveness of U/CI integration is partly a product of the quality of the content its arrangement and communication format, how well it has been understood and the designer's ability to respond to a brief. Although this should be fairly consistent when compared to the likely variation between different communication and interpretation techniques, it is the communication

method and format upon which the designer will depend that may influence the adopted approach to a given design problem. The designer's individual ability to interpret and empathise should be taken into account; some designers will be more skilled than others.

## 8.5 Conclusion

Detailed below are the strengths that should be encouraged and the weaknesses which have been presented as opportunities for improvement. It can be seen that these opportunities appear common across the vast majority of tools whilst some of the tools' strengths are another's weakness. Collectively the common ground among the strengths and opportunities have been categorised into themes traceable to their origin from the SWOT analyses (appendix C) as a contribution to governance for future U/CI communication tools.

- Ensure that all stages are time conscious (consider Central Hub)
- Ensure that the elicitation activity placed upon the consumer is readily understood accessible for the consumer to feed back and the designer to interpret
- Enable consumers to take their own direction for a truly exploratory and naturalistic inquiry
- Provide opportunities to communicate using tangible methods inc 3D artefacts, image boards
- Capture both overt and latent needs; consumers will tell you what they think you want to know
- Use resources sparingly with self reporting where possible
- Recognise the difference between values, aspirations and sociocultural norms
- Keep narrational dissonance to a minimum where possible
- Offer context and background to convey a wider understanding of the research findings
- Triangulate
- Support consumer/ participant comfort and confidence; consider Ice breakers and pre session meetings
- Support opportunities to inquire, explore and probe the results as a tool for meta analysis of the research.
- Ensure that the designer and researchers have the necessary training
- The communication format must not be over looked

## 8.6 Limitations

The strengths and weakness are derived from a desktop review and certain tools may actually be better than they appear. However, where the tools' descriptions and example applications fail to disclose the associated U/CI techniques (to collect/interpret/communicate) this does not necessarily mean they have been neglected. The lack of any description in itself, does imply, however, a lack of recognition to define those vital collect/interpret/communication details within the tool.

## 9.0 Taking a Closer Look: Ethnographic Output in Design

## 9.1 Introduction

Identified as the preferred method for requirements capture, to inform design action (chapter 4.3 and 6.5), The current state of ethnographic output for design has been investigated through a review of over 20 different U/CI communication methodologies, biased towards the output of ethnographic work. The different communication approaches have been associated with but not necessarily exclusively to ethnographic methods.

The desktop review involved the categorisation of these methods into communication types. Which have been analysed in terms of their strengths and opportunities as a contribution towards a multi-source governance framework for ethnographic output in design.

When designing for emotion, it has been suggested from the tool review that consumer insight for product development is typically communicated to designers through a combination of various experiential methodologies. These approaches facilitate the conscious exploration of consumer needs in opposition to more prescriptive specifications. Experiential methods encourage designers to engage and empathise with the consumer. Designers can deduce from the context to a detailed causality and induce from the detailed requirements; this approach may facilitate a greater understanding of the wider implications of a requirement and how that requirement might be integrated within the system.

Many of these experiential methodologies can be, and have been used as, an output for ethnographic work to inform design. The ethnographic approach strengthens the opportunity for designers to empathise with consumers through a multi-layered mental space encouraging ongoing dialog between the designer and what may be considered a type of meta-consumer. Ethnography is in itself about discovery; also a key proponent to innovation and a filter for narrational dissonance through a triangulated approach.

## 9.2 Aim

To contribute towards a governance framework for the future communication of user/consumer insight (U/CI) to design teams as part of a wider systems approach to a comprehensive governance framework for the output of ethnographic work in design.

## 9.3 Objectives

- To identify the available U/CI communication methods and collectively explore their apparent strengths and opportunities for improvement.

- To categorise the emergent themes arising from the methods' strengths and weaknesses to offer governance for the communication of U/CI to design teams.

## 9.4 Method

This study adhered to a systems approach as the guiding framework to encapsulate and guide the research programme; complex and trandisciplinary in nature, drawing on different sources of data in accordance with the research strategy; chapter 2.

The review (see extract from appendix D) relied upon a grounded theory approach and did not start out with any pre-conceived judgment criteria. It was the intention that the performance 'criteria' as key indicators of good practice in communication methodology would emerge.

**Figure 9-1: Appendix D Extract: Consumer Research Output**

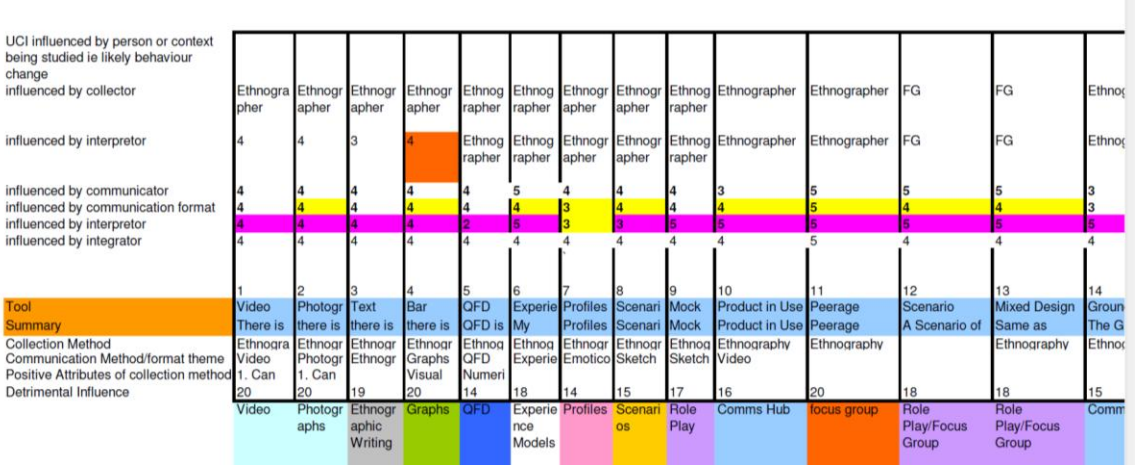
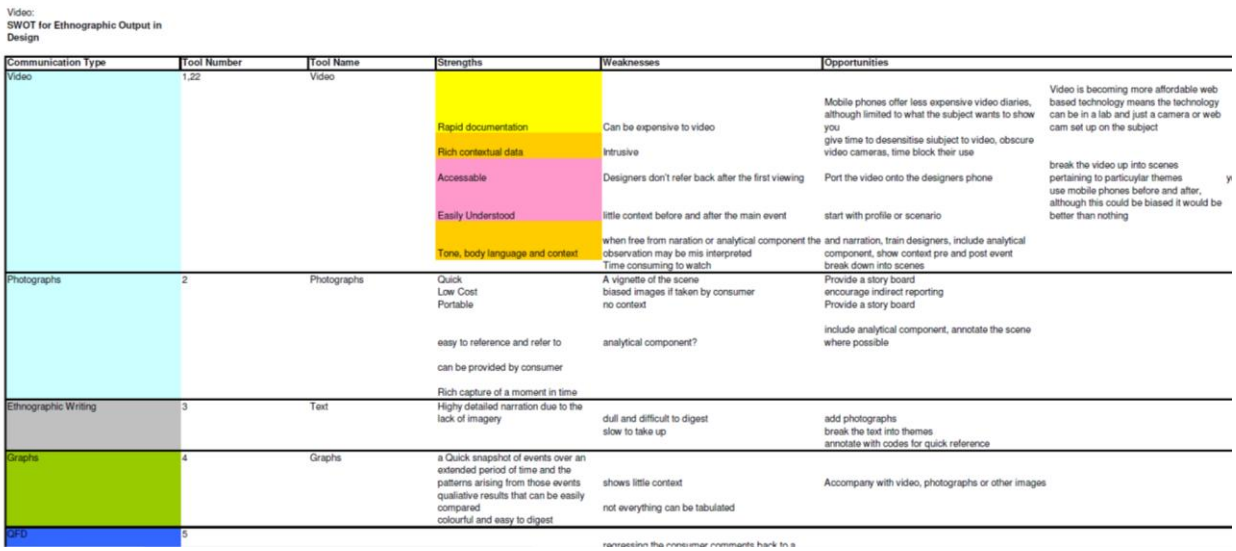


**Figure 9-2: Appendix D Extract: Consumer Research Output**



Video:
**SWOT for Ethnographic Output in Design**

| Communication Type | Tool Number | Tool Name | Strengths | Weaknesses | Opportunities | |
|---|---|---|---|---|---|---|
| Video | 1,22 | Video | | | | |
| | | | Rapid documentation | Can be expensive to video | Mobile phones offer less expensive video diaries, although limited to what the subject wants to show you | Video is becoming more affordable web based technology means the technology can be in a lab and just a camera or web cam set up on the subject |
| | | | Rich contextual data | Intrusive | give time to desensitise siubject to video, obscure video cameras, time block their use | |
| | | | Accessable | Designers don't refer back after the first viewing | Port the video onto the designers phone | break the video up into scenes pertaining to particuylar themes y use mobile phones before and after, although this could be biased it would be better than nothing |
| | | | Easily Understood | little context before and after the main event | start with profile or scenario | |
| | | | Tone, body language and context | when free from naration or analytical component the observation may be mis interpreted<br>Time consuming to watch | and narration, train designers, include analytical component, show context pre and post event<br>break down into scenes | |
| Photographs | 2 | Photographs | Quick<br>Low Cost<br>Portable | A vignette of the scene<br>biased images if taken by consumer<br>no context | Provide a story board<br>encourage indirect reporting<br>Provide a story board | |
| | | | easy to reference and refer to<br>can be provided by consumer<br>Rich capture of a moment in time | analytical component? | include analytical component, annotate the scene where possible | |
| Ethnographic Writing | 3 | Text | Highy detailed narration due to the lack of imagery | dull and difficult to digest<br>slow to take up | add photographs<br>break the text into themes<br>annotate with codes for quick reference | |
| Graphs | 4 | Graphs | a Quick snapshot of events over an extended period of time and the patterns arising from those events<br>qualiative results that can be easily compared<br>colourful and easy to digest | shows little context<br>not everything can be tabulated | Accompany with video, photographs or other images | |
| CFD | 5 | | | regressing the consumer comments back to a | | |

## 9.5 Results and Discussion

Communication methodologies for consumer insight can fall into the following categories some of which serve as communication methodology for both general observational consumer research and ethnographic inquiry. It is quite apparent from the literature, and the lack thereof, that little guidance exists for the communication of ethnographic work in design with no single best practice beyond the written word and the content of ethnographic work (Hammersley and Atkinson 1995).

The design of ethnographic outputs for collaborative work within teams is a relatively unexplored topic with no overall consensus on the output of ethnographic work for design teams (Diggins and Tolmie, 2003). When guidelines for communication are offered they are typically borrowed from other field-based techniques (Becker 1986; Richardson 1990; Wolcott, 2001). Guidance for the content of ethnographic work then becomes a key proponent in the development of governance for its communication.

Diggins and Tolmie (2003) contend that the communication format is often unruly, more often resolved by local negotiation on a project basis. Diggins and Tolmie (2003) found that in most of these situations the ethnographic output was a diagrammatic representation to communicate with designers.

### 9.5.1 Communication Methodologies

**Table 9-1 User/Consumer insight communication formats**

| Communication Type (Theme) | Component Subset Examples |
|---|---|
| Text | Ethnographic Writing / Requirements Specifications |
| Imagery | Photographs |
| Video | Video Diary / Audio / Product in Use |
| Matrices | Graphical Representation / Graphs / QFD |
| Caricature | Profiles / Personas / Emoticon / Personal Card Sets |
| Participatory | Focus Groups / Role Play / Participatory Design / Scenario of Use / Sketch Models / Mock Ups / Peerage Congregation / Mixed Design Groups / Coherence Method |
| Content Maps | Grounded innovation Map / Presentation Framework / DNP Designer's Note Pad |
| Context Maps | Scenarios / Story Boards / Patterns / Contextual Experience Models / Experience Models (Rich Pictures) / Product Ecology / View Points |

#### 9.5.1.1 Text: Ethnographic Writing / Requirements Specifications

The traditional output of ethnographic work is a written report for the description of peoples and to provide cultural understanding. The ethnographic text is a second hand description not a veridical representation of the world. Preliminary field notes are written in the first instance in the field as the ethnographer directly participates within the community under observation (Emerson, Fretz, and Shaw (1995). Much of these field notes are then expanded at a later time usually on the same day. The ethnographer moves from mental notes to preliminary jotted field notes to full field notes (Emerson et al. 1995).

### 9.5.1.2 Imagery: Photographs

Photographs can be used to capture a particular scene identified as important or telling by the ethnographer (Carey, 2004; Gazca, Palou, López-Malo, Garibay, 2009). Not only the content of the image is important but the decision to capture that particular scene may be of use when seeking to understand the consumer. For example, when consumers are invited to diarise their own life through images they will tend to focus on creating a reality from their aspirations not necessarily images that may present them in a negative light.

### 9.5.1.3 Video: Video Diary / Audio / Product in Use

The ongoing capture of a particular activity or activities to motion pictures offers very rich data that can be used as an ongoing resource time and time again. The designer can observe consumers in context before and after the introduction of a new technology.

Product in Use (Burns, Barrett, Evans, Johansson, 1999) is the naturalistic observation of users interacting with products in real environments away from the laboratory and any artificial context. The Product in Use tool directly observes users and consumers and the information is passed directly to design teams with little to no analysis prior to it being disseminated within the design team. The design practitioners are therefore, expected to make their own judgment and extract their own requirements from the collected data. This approach is inevitably time consuming to conduct and watch, and designers are not trained to interpret these sorts of data: the lack of any analytical component may prove problematic.

### 9.5.1.4 Matrices: Graphical Representation / Graphs / QFD

Numeric and tabulated data can be a comfortable way to communicate for the more technical engineering designers, in a format they will be practiced in using. There is inevitably a large amount of distillation to take the rich data arising from ethnographic inquiry into a tabulated or graphical form that typically represents a single dimension at any one point in time. Matrix style communication formats such as QFD are useful to collect, collate and communicate requirements within a single framework, however, the qualitative results are only as good as the constructs used to measure them. QFD is a framework for listing, grading and communicating product quality and function requirements to be deployed within a designed artefact system or service.

There is a disconnect between the collection of these requirements and how they are actually graded or even included within the requirements framework referred to as the QFD house of quality. The design researcher assigns the importance of particular requirements to guide the design activity. How these requirements are translated and their relative weight between neighbouring requirements are very much open to judgment and the interpretation of either the consumer, ethnographer or design practitioner.

In the use of QFD there is very often a failure to identify consumer requirements that delight the customer. This failure has been attributed to the translation of customer statements into a usable format for designers: it is the analytical component and the communication format that lets this approach down, not the concept of rating requirements in terms of the products quality and function (Johansson, Burns, Evans, Barrett, Karlsson, 2000).

### 9.5.1.5 Caricature: / Profiles / Personas / Emoticon / Personal Card Sets

Caricatures can be a very useful way to communicate with designers. The visual approach and mental space that is created by presenting a particular demographic encourage designers to empathise with the target market. If one knows the principles or values of a particular consumer (who am I, who do I want to be, and who should I be) we are able to make judgements on how they are likely to respond to certain features; for example, an environmentalist would be disgusted by the use of non re-cyclable materials. This approach is of course vulnerable to assumptions and judgments being made about the consumer that may not be true.

Profiles or personas, (Blomberg, Burell, and Guest, 2003; Blomquist and Arvola, 2002) in a similar fashion to scenarios, are points of reference for designers to keep the user requirements at the forefront of their minds. Profiles are a representation of the typical characteristics possessed by users and their expectations typically presented as text. Personal Card Sets (flash cards) (Sleeswijk Visser, Van Der Lugt, Jan Stappers, 2004) are used to represent real users that designers can refer to during the design process.

The communication of U/CI through caricatures inherently comprises an analytical component in creating the profiles. This analytical component does not extend to a critical design of implications for design. These are envisaged and formulated by the designer whilst exploring the profiles themselves.

### 9.5.1.6 Participatory: Focus Groups / Role Play / Scenario of Use / Sketch Models / Mock Ups / Peerage Congregation / Mixed Design Groups / Coherence Method

Participatory methods are an opportunity for the designer to experience, either first hand, or through role play, the context of use. Participatory methods enable the designer to then reflect and draw upon their own experiences as the user; this approach does however come with the complication that designers are not always typical users.

Through focus groups a collection of people are brought together to discuss a particular topic (Langford, and McDonagh, 2003). The aim is to elicit people's motivations, feelings and experiences towards a particular subject area, problem or product to be evaluated. The group relies on a unique dynamic among participants that generate and reciprocate ideas and share experiences with each other. This emergent approach often results in diverse, and sometimes unexpected, courses of inquiry; although beneficial for the broader context this can be a challenge for the facilitator to manage. Furthermore, this emergent property arising through the interaction of participants can also bias participants' comments and involvement within the group. Data gathered during the session can be coded and categorised into themes to guide the development of new products.

A 'Scenario of Use Workshop' (Blomberg, Burell, and Guest, 2003; Burns, Barrett, Evans and Johansson, 1999) based on the structure of a focus group but with a storyline acted out in front of the group. There are ordinarily three facilitators; one actor, one director and one note taker. The actor is directing through the role play and the members of the group highlight needs, potential concerns, and problems. The group would typically consist of a combination of consumers and members of the product development team. Mixed Design (Burns et al., 1999) is typically the same; a scenario of use workshop that includes real consumers within the role play.

'Mock Ups' (Blomberg et al., 2003) refer to sketch models of an existing product or feature to be evaluated within the user environment; they can be a total context or simply an artefact within that context. Mock ups can also be used as a critical design tool to insert the proposed solutions or designs into the context to evaluate its success and/or generate further requirements. Mock ups are able to very quickly convey design proposals in relation to the existing context of use revealing potentially new requirements not previously considered.

Peerage Congregation (Burns, Evans, Johnansson and Barret, 1999) is not necessarily a tool for ethnographic communication but a tool for the use of ethnographic data, Peerage Congregation is

an interesting tool that seeks to unite designers from different fields i.e white goods, outdoor equipment etc so that working together they can draw on each others' expertise and different approaches. This could be considered a forced morphological connections approach but using non related designers to work together.

The coherence method (Viller and Sommerville, 1999) advocates the design researcher, as opposed to a 'classically' trained ethnographer, perform the ethnographic inquiry. The coherence method offers guidelines for how the design researcher might carry out such work.

#### 9.5.1.7 Context Mapping: Scenarios / Story Boards / Patterns / Contextual Experience Models / Experience Models (Rich Pictures) / Product Ecology / View Points

Context Mapping (Jones, 2006) places emphasis on formulating a context or a particular scene around a particular demographic and/or the product requirements. The context map can either present a typical, yet pseudo context, for the likely scenario of use before and after the introduction of a new technology or process to a particular way of life. Alternatively, contexts can be mapped into various view points (Viller and Sommerville, 1999) and perspectives to explore the implications on a wider range of stakeholders.

Scenarios show how a user interacts within a particular environment or with a particular product. The scenario is context focused which offers profiles or personas of varied characteristics against a common background to emphasise the importance of context and demonstrates that a single context can mean different things to different people.

Patterns (Hughes, O'Brien, Rodden, Rouncefield, & Viller, 2000; Crabtree and Rodden, 2002) communicated through tables, text summaries and photographs promote a best practice for social design. Patterns catalogue a series of situations and human work to detect patterns of behaviour to specific contexts, product features and other stimuli. The intention is to eventually compile a library of patterns, potential delighters and opportunities for delight through discovery via the ethnographic research. The design can then draw upon previously successful features or implementations to a specific context. There is of course the inevitable concern that one pattern from one context will not always apply to other scenarios.

Experience models (Jones, 2006; Frankel, 2009) are a flexible graphical representation of the consumer experience that can take various forms in their representation, not working to any pre-determined guidelines for communication. However, whilst the communication format is not

consistent the content is; representing experiences over time and space before and after what may be construed as the core experience.

Product Ecology (Forlizzi, 2007) is a framework for creating contextual diagrams for the scenario of use. Whilst this embodies the need for rich contextual background and the identification of dependencies on change, there remains no explicit format to guide communication from the design researcher / ethnographer to designer.

'View Points' (Viller and Sommerville, 1999; Hughes, O'Brien, Rodden and Rouncefield, 2000) offer a perspective from which to communicate ethnographic data to designers. The view points are more of a guideline than a formal communication format to present:-

1. The ecology of work: spatial distribution of the work place.
2. Views of work: perspectives on the ethnographic findings.
3. The flow of work: work flow, traces and information transition.

#### 9.5.1.8 Content Mapping: Grounded innovation Map / Presentation Framework / DNP Designer's Note Pad

Content Mapping refers to the process of cataloguing ethnographic work into a searchable organised repository. The ethnographic storage space can incorporate links to stakeholders, enablers and their spatio-temporal dependencies.

As with the Grounded Innovation Map (Diggins and Tolmie, 2003) the ethnographic work is categorised and can be linked to other related categories within the map often shown as a type of flow or network diagram. Typically content mapping does not offer any implications for design.
The presentation framework (Viller and Sommerville, 1999) effectively groups the type of behavioural phenomenon into three categories:-

1. Distributed coordination
2. Plans and procedures
3. Awareness of work.

The Designers Note Pad (DNP) (Hughes, O'Brien, Rodden, Rouncefield, 2000) assigns symbols to the ethnographic data collected. These symbols can represent individuals' movement through space and time. The practice of the subjects under observation and other related information are

held in an electronic format (software) repository that can be moved around and connected to various dependencies.

The DNP does strive to remain true to the ethnographic work; typically adapting the standard text and communicating it to designers within an interactive network diagram allowing for linking tasks, people, time and space with multiperspectival viewpoints.

## 9.6 Conclusions

As with any commercially motivated process, the communication and uptake of ethnographic work for the purposes of design remains time sensitive. Time scales always apply and the content must be immediately tractable (Diggins and Tolmie, 2003) (tools 1,22,2, 8,21,7,15) whilst maintaining a rich contextual overview with pre and post context summaries to offer a foundation for the recipient of the ethnography (tools 1,22,3,7,15,8,21,6,18,20).

The use of codes, themes and categories (Tools 3, 5, 7, 15) can be particularly useful for quick reference and traceability to the data source (tools 1,2,22). Traceable sources support credible consumer requirements and should limit requirement regression; or perhaps more accurately progression of the consumer comments back or up to a 'consolidated need'. This is practical although the process may risk losing the key requirements of the consumer and placing more of a focus on the ethnographer's interpretation.

It is important to represent multiple perspectives/stakeholders which will in turn encourage critical scenarios and a wider systems view (tools 6, 7,8 11, 12,13,15, 18, 20, 21). Where possible the opportunity for discovery and emergence as well as targeted problem solving (making the invisible visible) would be of great value; central to innovation. The opportunity for the recipients of the ethnographic work to participate, discover and collaboratively construct the content would support interpretation and meta-analysis of the work (tools 10, 14,16,17,19,11,12,13, 6, 18, 20).

When seeking to outline the key requirements for the output of ethnographic work it remains that any format will depend also on the content of what is actually being represented. The SWOT Analysis of the communication methodology for UCI resulted in the following emergent governance (Table 9-2) to be considered as a part contribution towards a framework for the output of ethnographic work in design.

**Table 9-2 Governance for the output of ethnographic work from the available tools**

| |
|---|
| • Remain sensitive to tight time lines |
| • Maintain a rich contextual overview |
| • Aim for Immediately tractable representations |
| • Summarise pre and post context where possible |
| • Employ thematic arrangements |
| • Support rapid reference and index |
| • Enable show/hide for analytical component |
| • Maintain traceability to source |
| • Support a visual output |
| • Enable annotation with codes for rapid recall and reference |
| • Represent multiple perspectives/stakeholders |
| • Triangulate to avoid narrational dissonance |
| • Use memorable language |
| • Encourage discovery and emergence as well as targeted problem solving |
| • Support critical scenarios |
| • Consider Collaborative construction of the Ethnographic output |
| • Any visual model is by nature an analytical device |
| • Offer the output as a shared point of reference for multiple practitioners |
| • Avoid requirement regression diluting the source into a requirement that loses its meaning and origin LIT. Regressing the consumer comments back to a 'consolidated need' is of course practical but risks losing the key requirements of the consumer, do not depart too far from the original consumer concern or requirement. |
| • Consider a participatory component |

## 10.0 Supporting Frameworks for Ethnographic Work

The following discussion outlines, in brief, a collection of frameworks for the practice of ethnographic work, to be included as an additional source of governance for the output of ethnographic work  the relevance of these frameworks is founded upon the grounds that the method for U/CI collection inevitably has influence over that of its communication and should be considered as a valuable contribution. These tools have been cited within Hey (2007) online web portal.

Obrist, Bernhaupt and Tscheligi, (2008) in their ethnographic work of the home have used the following contextual components to guide their study:

**Table 10-1 Guidance from Obrist, Bernhaupt and Tscheligi (2008)**

| |
|---|
| • Spatial Context i.e. where is the technology located where can it be located |
| • Temporal Context i.e. when is the technology used, is it daily, weekly, monthly, seasonal |
| • Social Context: is it used alone does the technology encourage social connections and particular behaviour, is there a social structure of who can and cannot use the technology |
| • Personal Context: demographic data, prior experience with other technology extrac**u**rricular activities, hobbies and interests. (Possibly, who am I and who do I want to be and who I think I should be). Respectively VAN; Values, Aspirations, social Norms. |
| • Technological Context: what type of technology is it i.e mobile, catering, and so on. What other technology is used with it or near it possibly consider, what category does the technology fall into? Household, mobile and home use (Gawlinski, 2003; Jaasko & Mattelmaki; 2003). |
| • Context of the context i.e. office, industrial estate, nation; and cultural factors. |

Button (2000); Hughes, et al. (1995); Hughes et al. (1997) Diggins and Tolmie (2003) Focus on the collaborative work of designers and ethnographers and the ethnographic output. Diggins and Tolmie (2003) encourage the use of diagrams grounded innovation maps and consequently offer some guidelines for the communication of ethnography to designers as a result of their own experiences and the type of formats requested by designers for ethnographic work.

**Table 10-2 Guidance from Button (2000); Hughes, et al. (1997) Diggins and Tolmie (2003)**

| |
|---|
| • Iconicity – Icons and images are a fast and powerful tool to convey the meaning of a larger system or context in a relatively small space. |
| • Indexicality – supports understanding of the ethnographic work particularly through dependencies and relevancy, and ostension. |
| • Ensure the ethnographic output is economical in space and uptake. |
| • Present findings in an immediately tractable way in consideration of the existing competencies of designers. |
| • Support collaborative ostension and annotation. |
| • Enable the formulations of findings to be made situationally relevant rather than pre-formulating what that relevance might be (Diggins and Tolmie, 2003, p152-153) |
| • Avoid reducivity, the representation of ethnographic field work is not a veridical representation of the world any reducivity from the source, summary or secondary representation risk a loss of potentially important data from the study and diversity of the findings. |
| • Overly categorised findings may constrain future thinking and design. |
| • Sequentiality & organisational Accountability: present the diagram at the right time and place within the design process. |
| • Ordering and logic of practice; the introduction and use of the diagram will need supporting to demonstrate its meaning and use to the recipients. |

Burns, Barrett, Evans, Johansson, (1999) suggest the following cues to look for as guidelines when conducting field studies to support empathic design, these cues might be considered to influence the output of ethnographic work.

**Table 10-3 Guidance from Burns, Barrett, Evans, Johansson (1999)**

| |
|---|
| • Frustrations and confusions |
| • Fears and anxieties |
| • Wasted time |
| • Doing things wrong |
| • Misuse or unexpected usage |
| • Dangerous situations during use |
| • Customer sourced modifications of the product |
| • Fringe customers or extreme users (e.g. disabled users). |
| • Triggers of use – what circumstances prompt people to use a product or service? |
| • Interactions with the user's social and personal environment |
| • Intangible attributes of the product (peripheral, intangible or emotional) |

Rosenberg (2001) characterizes ethnography as comprising the following components that should in turn be considered as guidance for the output of ethnographic work.

Triangulate from both a range of sources and situations, study action in social and cultural contexts to reveal complexity rather than limit what can be understood by your own bias towards what may or may not be important. Rosenberg believes this unstructured approach to data collection encourages key features to emerge and evolve through ongoing analysis.

E-Lab, (1997) (cited in Wasson (2000) developed the AEIOU framework to support the interpretation of observations

**Table 10-4 The AEIOU Framework**

| |
|---|
| • A - Activities are goal directed sets of actions-things which people want to accomplish |
| • E - Environments include the entire arena where activities take place |
| • I - Interactions are between a person and someone or something else, and are the building blocks of activities |
| • O - Objects are building blocks of the environment, key elements sometimes put to complex or unintended uses, changing their function, meaning and context |
| • U - Users are the consumers, the people providing the behaviours, preferences and needs |

Spradley, (1980) as cited in Robson (2006) offers 'nine dimensions' to guide the collection of descriptive observations from field studies.

**Table 10-5 Guidance Spradley's 'Nine Dimensions (1980)**

| |
|---|
| • SPACE – Layout of the physical setting; rooms, outdoor spaces |
| • ACTORS – The names and relevant details of the people involved |
| • ACTIVITIES – The various activities of the actors |
| • OBJECTS – Physical elements: furniture etc |
| • ACTS – Specific individual actions |
| • EVENTS – Particular occasions, eg. meetings |
| • TIME - the sequence of events |
| • GOALS - what actors are attempting to accomplish |
| • FEELINGS – emotions in particular contexts |

Anderson and Rothstein (2004) presents the following 'AX4' as a framework for data collection analysis and scenario building

The framework is used as a guide for the necessary content during the collection of contextual information, followed then as a series of categories for content to be communicated to design teams. Rothstein then discusses a third stage again using the same categories to communicate a speculative image or scenario for a proposed consumer experience.

**Table 10-6 The AX4 Framework**

| |
|---|
| • Atmosphere |
| • Actors |
| • Artefacts |
| • Activities |

Sotirin (1999) uses the following guidelines for what to look for when "making the familiar strange" as part of efforts to introduce university students to ethnographic assumptions.

**Table 10-7 Guidance from Sotirin (1999)**

| | |
|---|---|
| • Territory | • How is space arranged? Who gets more or less? |
| • Stuff | • Who has what? What kind and how is it arranged? For what purpose? And how is it accessed? |
| • People | • Categorise, flow paths, dress, non verbal behaviour, authority, affection |
| • Talk | • What is said and to whom? Where? When? Formality? Terminology and frequency of use? |

Wasson (2000) contradicts Dourish (2006) and highlights that ethnography is more to do with the collection than the analysis; Wasson (2000) offers a summary of guidelines for analysis:
Burns, Barrett, Evans, Johansson (2000).

**Table 10-8 Guidance from Wasson (2000)**

| |
|---|
| • Identify patterns built from instances or events these pattern are themes |
| • Use software to annotate and organise video clips |
| • Provide a coherent narrative about the users world and their interactions |
| • How was the product used, when where how and why, |
| • What meanings and values did the product or event have |
| • Frame these findings into themes for implications for design |

Euchner (2004) cite Sachs (Social Solutions) and Jordan (Institute for Research on Learning) for the early adoption of the POSTA Model used to guide the collection of field based observations under the title of ethnographic work.

**Table 10-9 The POSTA framework**

| | |
|---|---|
| • P | • Person |
| • O | • Objects |
| • S | • Situations |
| • T | • Time |
| • A | • Activity |

Kumar and Whitney (2003) developed POEMS as a tool for recording users' interactions as a way to tag or index video observations. Each title i.e. the type of people, messages or objects will vary between the communities under study.

**Table 10-10 The POEMS framework**

| |
|---|
| • P - People |
| • O - Objects |
| • E - Environments |
| • M - Messages |
| • S – Services |

Van Maanen, (1988) identifies the major representational styles for ethnographic fieldwork as 1 Realist tales 2 Confessional tales and 3 Impressionist tales.

Maanen highlights that with all writing styles rhetorical conventions influence even the most neutral of realist tales. These 'tales' typically make no requirement on the author to report objectively describing routines, daily life or what is said and done from a member of the community's point of view.

Confessional tales offer the more personal perspective of the researcher, not only to include personal first hand experiences and accounts from the field, but also descriptions of the research process itself. Impressionist tales depict key moments and points of interest to demonstrate the experience, drawing the reader into the lives of the people within the community through a mapped impression of the community under study.

Whilst Maanen offers these three writing styles to represent multiple voices in the ethnographic text he goes on to say that ethnographic work not only routinely uses a mix of these writing styles but also other idiosyncratic writing conventions and rhetorical strategies can be found.

## 11.0 Arriving at the Framework

The governance framework promotes a particular way of thinking for the development of new technology and the emotional appeal of that technology to delight the user. As previously stated, the framework is not in itself a tool-set, but a philosophy upon which future tool-sets may be developed to facilitate innovation, targeted problem solving and offer creative direction. The framework provides an understanding of the arrangement and attributes a communication tool, for ethnographically inspired work should possess to support design-action, particularly when operating within the technical domain of engineering design. It is designed to promote, better, more inclusive design and compelling experiences for the consumer, placing a specific focus on the emotional appeal of new technology and the translation or engineering requirements into new technology.

Working within the grounded theoretical framework of soft systems methodology (SSM), governance for the output and arrangement of ethnographic work has emerged from multiple sources as shown overleaf within (figure 11-1). These grounded sources comprise a combination of exploratory, in depth studies and knowledge gained from the literature. The triangulated systems approach and the quest for multiple interrelated sources guided this research programme to provide, not only an understanding of the complexity, but also a way to identify opportunities for improvement and how those improvements might be implemented.

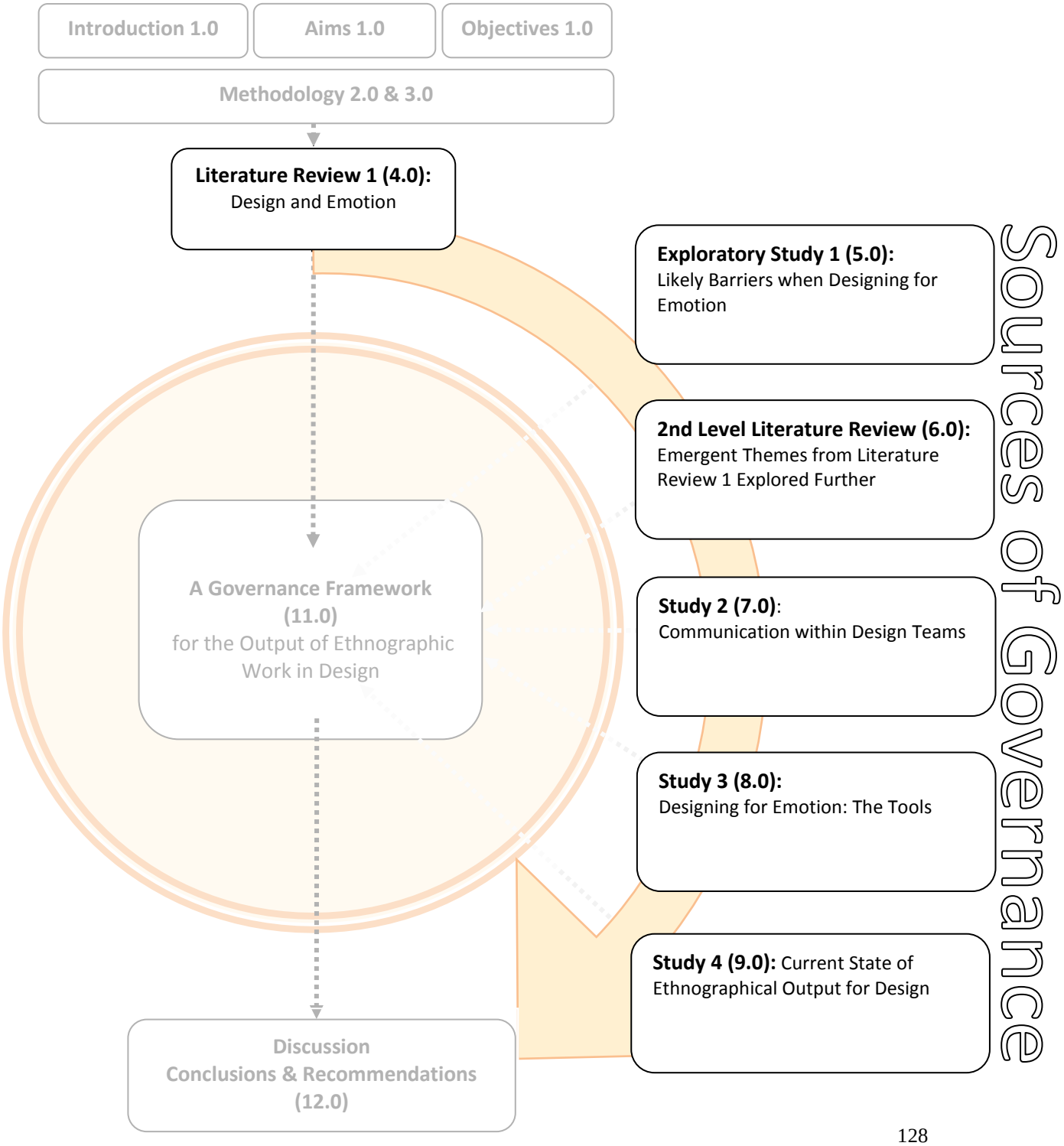
The framework seeks to facilitate innovation, targeted problem solving and offer creative direction for new product development, to promote, better, more inclusive design and compelling experiences for the consumer. Comprising a unified approach to traditional ethnographic methods and systems thinking the framework adheres to a type of ‘Action Ethnography’ bridging the gap between consumer research and design action.

The framework can be used to guide the arrangement and the output of ethnographic work within the design process and may also perform an advisory role for how ethnographers might better attend to the needs of designers through their ethnographic practice, requirements capture and communication. There are also some learning points that can be taken from this framework for other consumer research modes and scenario based professions for the ongoing development of their own communication strategy. This framework is a thought provoking tool for designers in receipt of consumer requirements; how to think about the data they receive and work with it.

The framework lends itself to the development of tools and other mental strategies to explore both, known gaps, and opportunities within specific problem areas, and the identification of new,

previously overlooked opportunities, through the framework's inherent properties of discovery, collaboration and emergence to offer creative direction. The diagram over leaf shows the sources and foundation of the framework which can be fully traced to over 390 individual sources of governance that have guided the research programme and the structure of this PhD Thesis.

**Figure 11-1**
**Content Diagram, highlighting the sources of governance for the emergent framework.**



Key points and governance within each of the items 4.0, 5.0, 6.0, 7.0, 8.0, 9.0 as shown within the Content Diagram/Research Logic have been identified allowing the most prevalent themes of governance to emerge rather than be imposed upon the literature. A list of Key governance from all the sources have been coded into themes traceable back to the original source data. These themes were further categorised into separate arrangements to generate either, a single, or where necessary, multiple concepts, to more concisely represent each theme as a manageable source for governance whilst remaining intact and true to its origin. Without this controlled level of abstraction the volume of data would, in itself, prevent any kind of useful application. The work culminated in amalgamated list of key components to form the emergent governance grounded in data shown below

**Table 11-1 Tabulated Governance Framework**

| |
|---|
| • Support Systems & Thematic Arrangements |
| • Identify and Represent Socio-emotional Drivers |
| • Incorporate Support for Critical Design |
| • Facilitate Emergence and Discovery |
| • Support Experiential learning and Collaboration |
| • Support Empathic Approaches |
| • Define Scope and Depth |
| • Minimise Narrational Dissonance |
| • Apply and Demonstrate Triangulation |
| • Work Towards Rapid Comprehension |
| • Support Multi Cultural Cross Border Working Environments |
| • Support Problem Solving, Innovation, and Evaluation |
| • Support Access to Source Data |
| • Encourage Dialogue with the Meta-Consumer |
| • Support Open Source Annotation and Collaborative Working |
| • Account for Multiple Perspectives |
| • Consider Mobile Use and Portability |
| • Avoid Overbearing Data and Remain Time Sensitive |

## 11.1 The Framework

### 11.1.1 Support Systems & Thematic Arrangements / Account for Multiple Perspectives

Note: reference numbers relate to the diagrammatical embodiment of the framework over leaf (figure 11-2), which has been explained further in item 12.0. It is logical that each reference should be included within the discussion of this point 11.1.1; however, returning to item 11.1.1 after full comprehension of item 12.0 will support greater clarity of the numerical references.

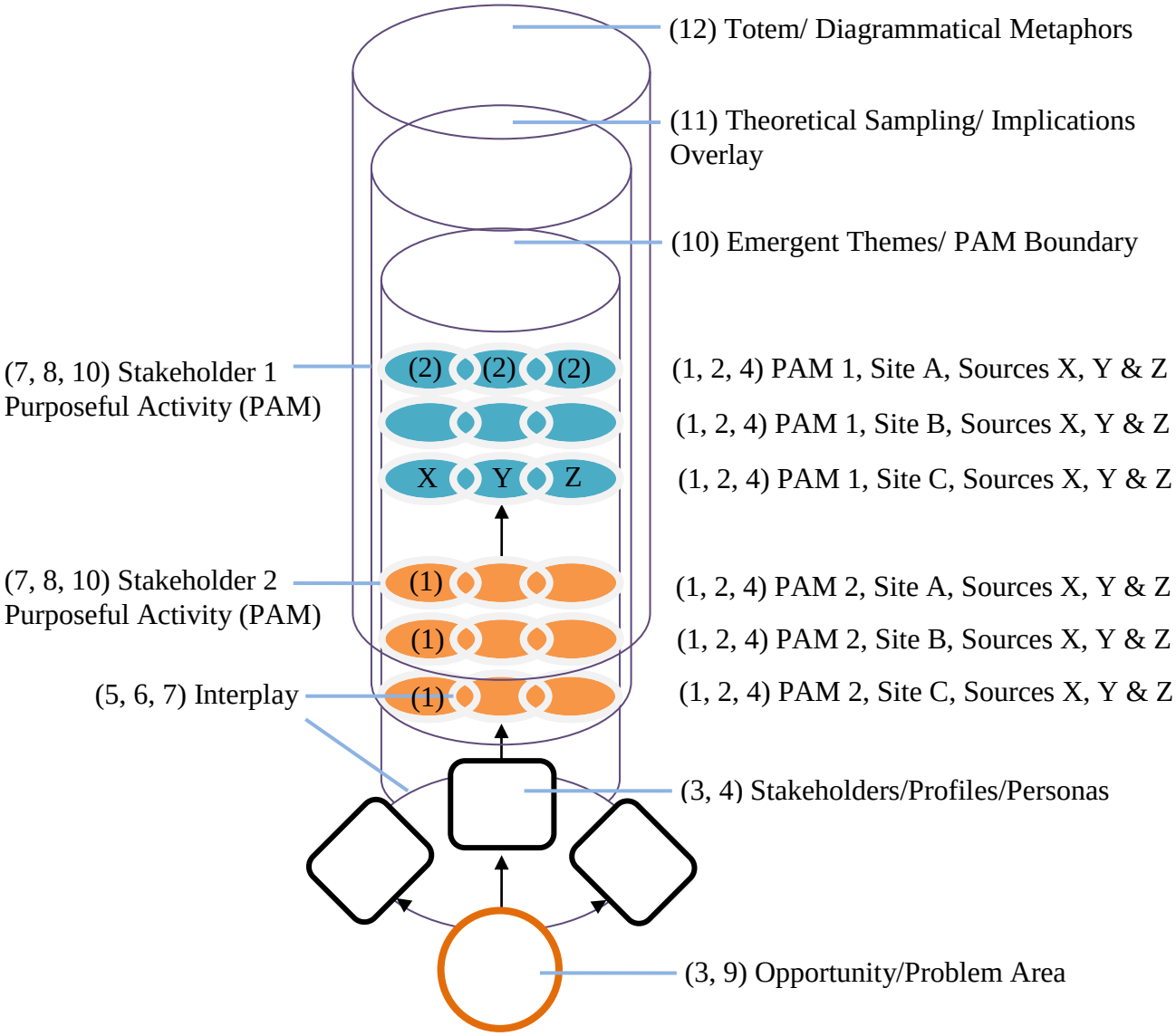
Adopting and adapting a systems approach for the output of ethnographic work supports the need for triangulation from several sites (1) and sources (2). Grounded in data (3), the systems theoretical framework is an ideal guide for ethnographic work; complex and transdisciplinary in nature drawing on different sources of data (4).

The systems approach is capable of addressing the interplay (5) among stakeholders from both emic (6), etic (7), micro (8) and macro (9) perspectives utilising the concept of 'rich pictures' (9) and 'purposeful activity models' (8) (see 2.1.2) which also bind the scope of inquiry (10) and offer a foundation from which themes/affinity or concepts emerge. Furthermore, the purposeful activity models (8) yield the emergent themes (10) and may highlight the extent of dependencies and implication of change to support a critical approach to design. The systems' use of rich pictures, stakeholders, and 'purposeful activity models' create an environment from which the underlying logic of their social practice may be understood (5). The incorporation of clearly outlined stakeholders (4, 8) inherently offers themes for triangulation, however, the emergent observations may be somewhat chaotic and their arrangement into thematic or chronological categories would be advisable (11) with more detailed concepts, coded and indexed, where applicable.

Whilst there will be naturally emergent themes (10), depending on the purpose behind the ethnographic work, various thematic templates or 'overlays' can be used (11). These are different lenses through which to view the data and the likely implications. These over lays may range from the emotional to the functional such as the implications on service and re-use, ease of assembly and manufacture, opportunities for the generation of new experiences interaction and sociocultural events. These emergent requirements, grounded in data, and triangulated from multiple sites and sources take into account multiple perspectives and facilitate collaborative working and a critical perspective arising from the likely design action. These requirements can be represented in many ways. It is not only the top level concepts or requirements that are accessible by the designer which is why the arrangement of the ethnographic work is inherently

combined with its communication. The format also provides a guide for ethnographic work within the design domain and may result in a super-ordinate representation or requirements, searchable and subject to critical review that is fed back to source. To promote rapid recall of the emergent requirements, this arrangement of ethnographic work may take the form of various diagrammatical metaphors such as a totem of key goals for the design work. An expanded definition of the arrangement of ethnographic work as communication, due to its inherent complexity, is discussed below.

**Figure 11-2: Diagrammatical Embodiment of Governance Framework for the Output of Ethnographic Work in Design**



The macro level context as an opportunity for improvement, specific problem area or backdrop for new innovation is represented by the orange circle. Stakeholders within the context are represented by the three black squares (figure 11-3)

For each stakeholder there may be multiple sites for the same or similar activities under study, the example below (figure 11-4) shows a female stakeholder drinking coffee in three different scenarios; home, work and whilst driving. for each of these sites there may also be multiple sources, for example, what is said by the stakeholder, what is done by the stakeholder, and what the stakeholder may think. The solid orange ovals represent these multiple site and sources of insight from an emic perspective whilst there may be a shadow data set for etic perspectives.

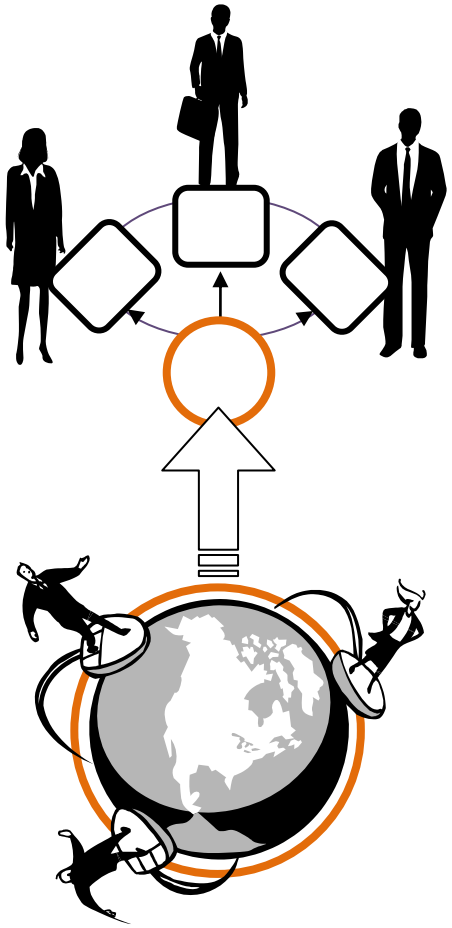
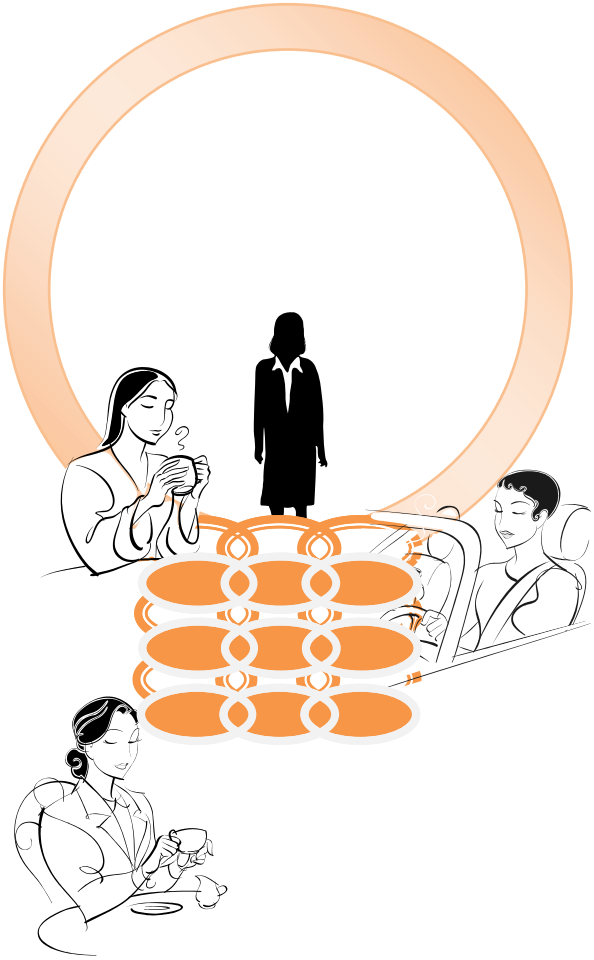


**Figure 11-3: Contextual Setting**



These sites and sources revolve around particular tasks or activities carried out by the stakeholder. These purposeful activity models are considered as a micro analysis whilst the wider macro implications (represented by the large softly shaded circle) represent the wider view of these purposeful activity models. The overlap between each oval indicates the interplay between the multiple sources for each site of purposeful activity.

**Figure 11-4: System Interplay**

Once the multisite and source data has been collected and mapped into the framework it may be coded to highlight emerging themes or concepts. These concepts are represented below by the initial cylinder having emerged from the purposeful activity models. The three individual cylindrical covers (figure 11-5) represent various lenses or overlays that may be applied to illuminate the most relevant data such as implications for a particular stakeholder, for example assembly, test manufacture, international sale, usability or certain values and consumer aspirations.

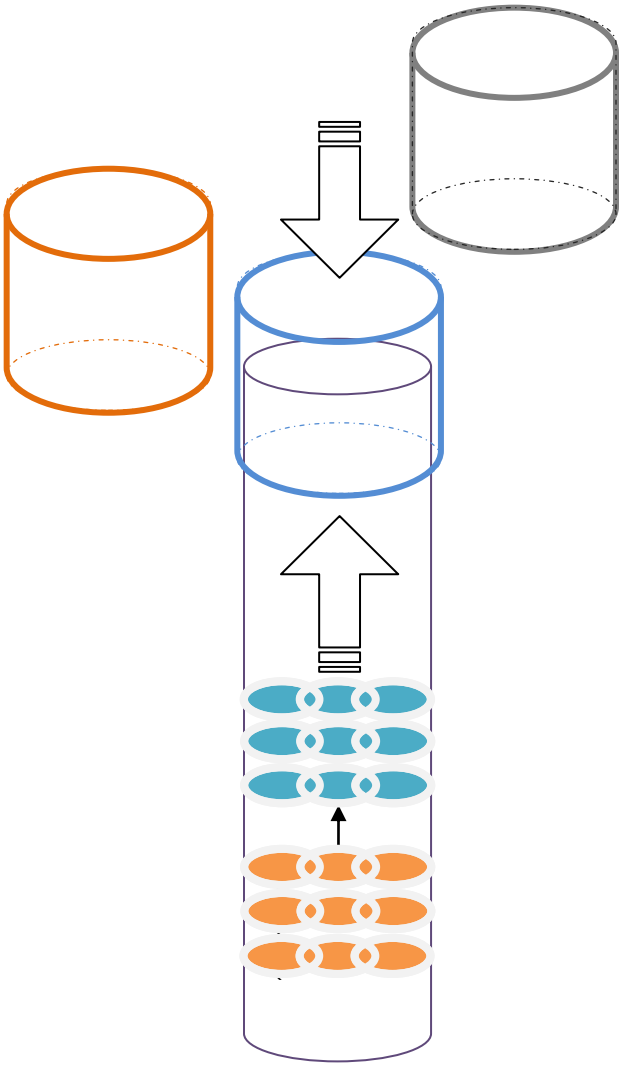


**Figure 11-5: Thematic Overlays**

Once the specific overlays have been used to define greater clarity for the design requirements one suggested representation may be diagrammatical metaphors such as the totem shown below as a quick reference. It should be made clear that this process does not negate or detract away from the importance of collaboration and exploration of the arrangement to facilitate discovery and annotation by the designers. The totem (figure 11-6) is a rapid reference that supporters of the framework may or may not choose to employ. The example below may suggest the desire for a

**Figure 11-6: Metaphorical Models**

low cost, attractive, delicate yet strong coffee flask for use at work, home or in transit.

The implications of change may be reflected upon one individual scenario or many scenarios as represented by figure 11-7. This represents the critical analytical component of the framework to be applied in many different scenarios to assess the dependencies, interplay and likely implications of change prior to making that change.

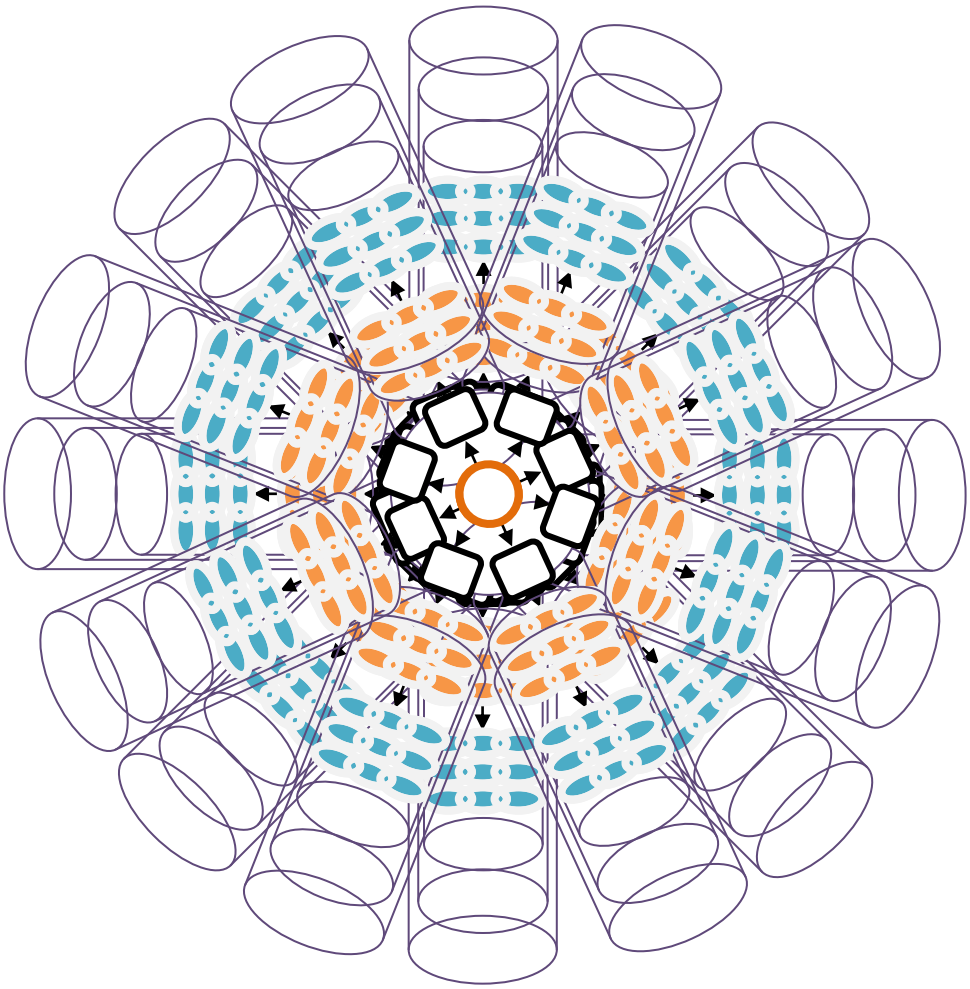


**Figure 11-7: Model of Action Ethnography; Critical Spatiotemporal System Analytics**

### 11.1.2 Identify and Represent Socio-emotional Drivers

Making the invisible visible is the mantra of ethnographic work, a reflexive spatio-temporal inquiry illuminating the otherwise overlooked socio-cultural phenomena of particular communities and people to inform design, from both internal and external perspectives. The ethnographic understanding is mainly understood in terms of the interplay between subjects of the community,

the ethnographer and the social setting. Most behaviour is either socially or emotionally motivated and has been discussed within this thesis as being socio-emotionally driven, drawing on concepts of emotion from the field of cognitive psychology (appraisal theory: Roseman 2001) their values, aspirations and beliefs as directional cues for delight (Disconfirmation Theory: Oliver, Rust and Varki ,1997).

### 11.1.3 Incorporate Support for Critical Design

Most design is critical, although not necessarily accounted for within the social context of use; a diversion from normal everyday practice (8); an alternative proposition that challenges preconceptions towards the generation of new activity, use and experiences. The likely implications of change can be considered within a critical approach to the design as part of this systems approach; observing the community under study, proposing a change to that community and the likely implications of that change understood in terms of the objectively drawn up purposeful activity models arising from the wider context (9). This critical approach is a readily available output from the ethnographic approach and compliments the analytical component of more classic ethnographic work to guide the design activity; a type of Action Ethnography; to analysing the problematic area (9) and take action to improve it. The critical view can be represented in symmetry to the observed situation with the implications of change considered directly against the previously identified purposeful activity models, the themes, stakeholders and wider context to then guide the output of ethnographic work for the purposes of design (action).

### 11.1.4 Facilitate Emergence and Discovery

Where possible the opportunity for emergence and discovery as well as targeted problem solving should be encouraged as a central theme to innovation (Arthur, 2009 and Nye, 2006, cited in Norman, 2011), creativity may be considered more prevalent during the discovery of problems, opposed to the process behind their solution. To emulate this discovery the framework encourages a collaborative approach to working with the data.

The ‘purposeful activity models’ (PAMs), associated contextual diagrams or’ rich pictures’ are frozen in time and as such offer key constructs to create understanding of a dynamic situation. Between these key constructs the reader is led to blend from one construct to the next and fill in the gaps. This blending a type of mental space phenomenon is an opportunity for new vision to emerge and to foster creative leaps in new directions.

### 11.1.5 Support Experiential Learning and Collaboration

Through experience and collaboration not only do we support innovation through emergence and discovery but also retention and rapid recall of the context under study through ostension and annotation. The collaborative approach encourages the recipient to map the content for rapid recall against their own points of interest and areas of concern for the specific development programme in which they are involved.

Collaboration is enabled through blending within the activity models and by giving participants the freedom to annotate what is specifically important to the recipient rather than limit what can be understood by one's own bias towards what may or may not be important. The collaborative model encourages this type of participation.

Collaboration may be further adopted through the enactment of the activity models as a type of script or walk through for role play or scenario building. This experiential participation may be used to facilitate empathy and discovery with the 'meta consumer'.

It is the intention of this framework to create a multi layered mental space for ongoing dialogue between designer and the meta-consumer, or consumer in the first person, when time scales allow.

### 11.1.6 Support Empathic Approaches

The PAMs encourage the generation of scenario walk throughs, role play and light weight participation to provide inspiration and support engagement; collaboration encourages the designer to watch, inquire and participate in the lives of the stakeholders adding their own narrative and concerns.

### 11.1.7 Define Scope and Depth

The scope and depth of ethnographic work could, in theory, extend across the globe far into the future and back through our history and origin, which of course is well and truly beyond the typical scope of most design projects. In the same respect the scope can also be too limited and neglect key constructs of a particular setting. Defining the scope and depth of ethnographic work is a challenge that is supported by the triangulated grounded theory approach among both sites and sources. The framework offers a diagrammatic boundary determined along the lines of dependencies and interplay within the setting under observation.

### 11.1.8 Minimise Narrational Dissonance

It is widely accepted that what people say, do and think are often different things. This presents a fundamental challenge to new product development. When people seek to explain their actions or how they might behave in a given environment, these descriptions are subjected to 'story telling' a type of narrational dissonance embedded within the descriptions and beliefs individuals hold and portray about their own behaviour (Wilson 2002). This is not to say that people are intentionally misleading. It is in fact quite the opposite.

The stories that people tell themselves to justify their behaviour are, in the main, genuinely believed to be true by themselves as an accurate representation of their motives and actions (Wilson 2002). The process of requirements capture is fraught with these communication obstacles.

The framework supports a reduction in narrational dissonance through multi-source and site triangulation, the clear identification of socio-emotional drivers and the inferences that can be made from those drivers. This approach, not only supports, but seeks to strengthen the contribution of ethnographic work to design practice, representing the emic, etic, and micro and macro perspectives of the people under observation.

### 11.1.9 Apply and Demonstrate Triangulation

Ethnographic work adheres to a relativist critical realist philosophy and resides within the exploration and study of the social world. As such any research strategy must triangulate what shall be considered as fallible realities towards an objective truth.

### 11.1.10 Work towards Rapid Comprehension / Avoid Overbearing Data and Remain Time Sensitive

In the context of real world product development it is fundamental that for all the study, theory and analysis, the output of ethnographic work is immediately tractable for rapid comprehension and reliable recall. The output must remain time sensitive and whilst there may be large volumes of data this shall be managed in such a way as not to overwhelm the recipient.

It is considered axiomatic that diagrammatical and graphical representations are favourable for this rapid comprehension as an index portal into the data through the various levels of abstraction back to source. This not only enables the designer to view manageable bites of insight arising

from the ethnographic work but also supports a comprehensive ethnographic approach, deeper analysis and provides the opportunity to delve into the findings from the field as and when required.

It may also be encouraged that for each study, diagrammatical metaphors (12) may be used to represent the key requirements as a type of totem for ongoing reference. These totems (12) may be a series of images that convey the essence of the ethnographic work for consideration throughout the design activity. The totems initially emerge from the implications overlay (11) founded upon the grounded themes of the study (10).

### 11.1.11 Support Multi Cultural Cross Border Working Environments

Design practice is a diverse multicultural activity that may be carried out across multiple sites and should support these typical working relationships in new product development. As the world becomes increasingly interrelated and organisations continue to operate within global and emerging markets, it is not only the artefacts being designed, but also the tools used by the designers themselves that should support these teams working in socially, culturally and geographically cross border environments.

### 11.1.12 Support Problem Solving, Innovation, and Evaluation

The framework lends itself to the development of tools and other mental strategies to explore gaps and opportunities within problem areas or particular contexts, to understand a particular problem or develop a specific product, to innovate through discovery and it offers creative direction.

### 11.1.13 Support Access to Source Data

Ethnographic work emphasises the rich in depth documentation of people's lives, the analytical component of the observed behaviour as part of a reflexive, perspectival inquiry. The governance framework supports this level of in depth study and analysis whilst encouraging a level of abstraction to work within a rapid development programme.

Supporting access to the source data enables designers to dig deeper, and build greater empathy with the lifestyles and people under study. Access to the source data enables the field based study to remain true to the traditional routes of ethnographic work and promotes a trusted relationship in the validity of arising implications for design.

Rather than limit what can be understood by one's own bias towards what may or may not be important, this approach enables the designer to filter and explore from their own perspective and, more specifically, to their needs and time frame. This traceability to source supports a collaborative analysis of the study with the opportunity for collaboration leading to the creation of tailored themes or overlays for the data (11). The designer, as recipient of this data, is in a position to then conduct their own theoretical sampling (11) to unearth points of particular interest that, in other more diluted ethnographically inspired techniques, may be overlooked.

### 11.1.14 Encourage Dialogue with the Meta-Consumer / Support Open Source Annotation and Collaborative Working

Open source annotation and the opportunity for recipients to overlay their own lens through which to view the data should be embraced not avoided. This promotes a streamlining of the data towards an immediately tractable solution whilst remaining true to the depth of ethnographic work.

The annotation is a point of contact between the designer and the consumer. The purposeful activity models can be considered as a type of scenario in which the designer can explore annotate and ask questions whilst stakeholders are represented as a user profile or other influential entity for consideration towards how they might respond to a change in their social setting and the activities within everyday life. These points of contact are opportunities for the designer to interact with a type of meta-consumer, to collaborate and blend from the data into new directions, scenarios and solutions.

### 11.1.15 Consider Mobile Use and Portability

The mobility of technology and peoples' lives is ever increasing and is therefore a key concern for the ethnographer when exploring communities, cultures and environments distanced from their own. There has always been a requirement for portability with ethnographic work, to watch, inquire and participate, however the increase of mobile technology presents a clear opportunity for use throughout a wide range of field based study. Where possible the governance framework encourages mobility and portability as a consideration, not only through the field work itself, but also in the way findings are communicated to designers who may work from home, trains, planes and automobiles, across multiple sites and offices. Portability also encourages the designers to benefit from enactment and role-play of the purposeful activity model, ongoing reference and immersion into the lives of those under study.

## 11.2 Why Action Ethnography?

Beyond more traditional ethnographic techniques Action Ethnography is founded upon a unified approach to systems thinking and traditional ethnographic methods; critical, analytical, and collaborative in nature to encourage emergence and discovery. The purposeful activity models offer a foundation for the recipient to conceptually blend the constructs of the activity to reveal alternative creative direction, that may, or may not have been considered. The opportunity for collaboration enables the designer to annotate and reference the findings rapidly whilst all insight may be fully traced back to source. Action Ethnography relies upon greater analyses, than other 'scenic' approaches, comparable to the analytical component of more traditional ethnographic work, yet adapted for use within the design domain; analysed in terms of the interplay between subjects of the community, the ethnographer and the social setting. It is inevitable that the research findings will undergo further analysis and adaptation by the designer. It is likely that research findings will be mapped into the communication tool which may be considered a level of analysis in itself. No single tool for Action Ethnography has been defined because Action Ethnography is not a tool but an approach underpinned by the framework of this PhD.

The 'Action' of Action Ethnography relates to the desire for change, to observe a particular setting and then change it. Prior to changing the context under study it may be subjected to a critical view or type of scenario to consider the likely implications of change, the dependencies, risk and likelihood of failure. Through the collection and critical analyses of ethnographic work Action Ethnography promotes rapid recall for the designer, valid data fully traceable to source. This approach seeks to encourage a type of multi-layered mental space within the designer's mind to represent peoples' everyday lives, the contextual setting and problematic situation observed; this approach encourages conceptual blending (Fauconnier and Turner 1998) to innovate future design solutions, provide creative direction and targeted problem solving.

It can be said that, often with hindsight, an innovation appears simple and obvious after the event. Previous familiarity with the individual constructs of an event is not the same as having had foresight, albeit often construed as such (see hindsight bias: Slovic and Fischhoff, 1977, cited in Myers, 2002). The constructs of innovation are evidently 'out there' in the world. Whilst Action Ethnography cannot guarantee innovation, the grounded critical systems approach supports foresight, considering the constructs emergent properties.

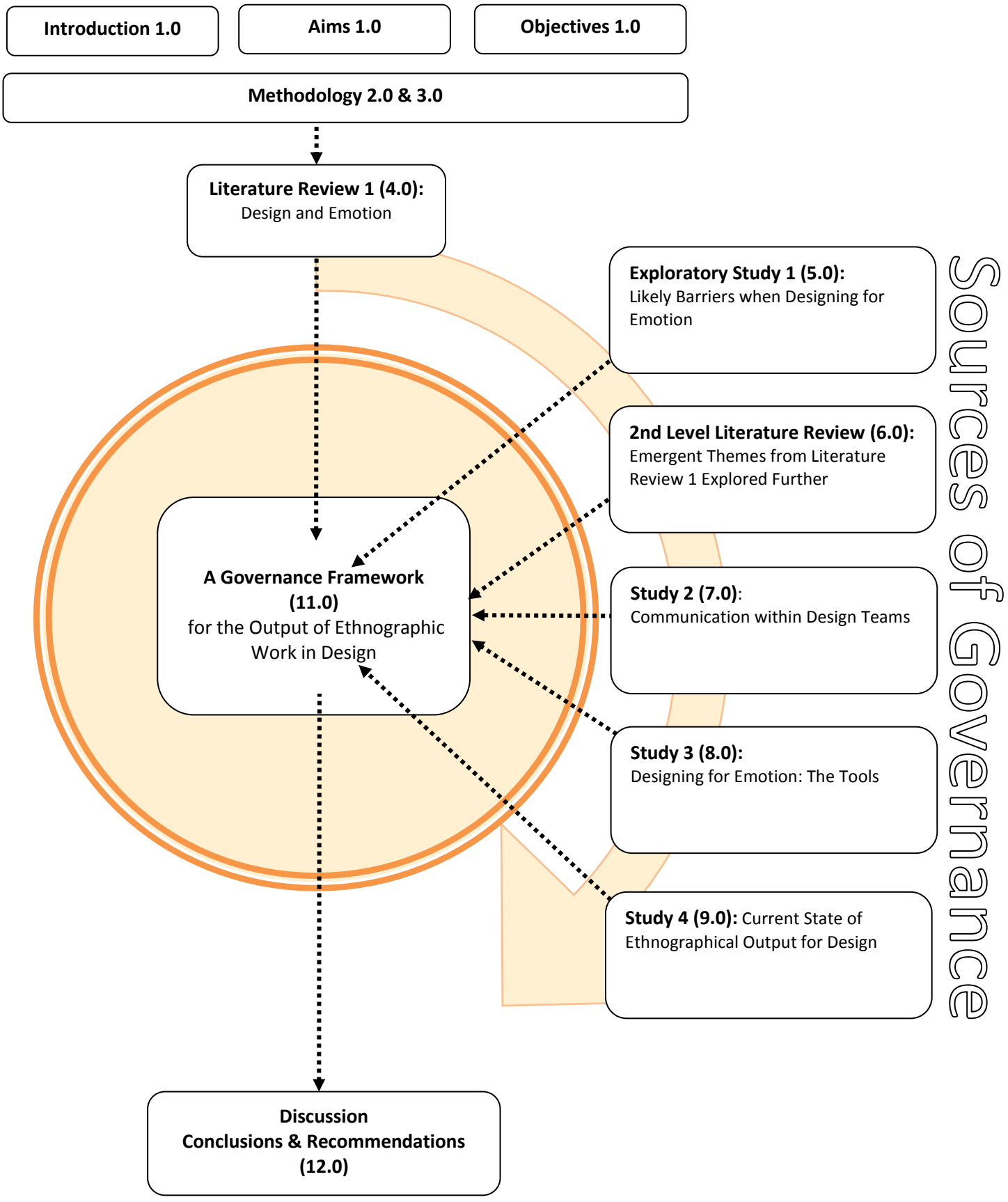
## 12.0 Conclusion

This research programme has met the initial aim, to provide an understanding of the arrangement and attributes a communication tool for ethnographic work received by designers should possess. The framework has emerged as an approach to facilitate innovation, targeted problem solving and offer creative direction for new product development to promote, better; more inclusive design and compelling experiences for the consumer. The framework comprises a unified approach to traditional ethnographic methods and systems thinking as a type of 'Action Ethnography' to bridge the gap between consumer research and design action.

This PhD thesis has met the objectives of the research programme; presenting a series of studies and literature reviews related to the origins and development of 'design and emotion', exploring the practical and philosophical barriers faced by designers when designing for emotion and the flow of communication within a 'real world' design team. The current state of tools and methods used by designers when designing for emotion have been examined with a critical review of the tools and methods to establish how designing for consumer pleasure is approached, and how consumer requirements are gathered, interpreted, and communicated. A desktop review of over 30 different design tools from the design & emotion movement and 24 different communication approaches for ethnographic work in design has been carried out, a two year case study on communication within the design process for a small to medium design and technology company in addition to a focus group and survey on the philosophical and practical barriers faced by designers when designing for these less tangible consumer expectations.

The multi-source governance framework was the result of a soft systems approach to problem solving for valid research, triangulated from several sources, grounded in data and assessed against a social research validity matrix. The content diagram (figure 11-1) offered a graphical narrative, which represents not only the contents of this thesis but also the research logic and the sources from which the governance framework has been created. The systems approach to this research relied upon a multi source approach to identify a thorough grounded view of the strengths and available opportunities to improve the arrangement and communication of ethnographic work.

**Figure 12-1: Content Diagram:**



## 12.1 Limitations

'Full' ethnographic methods can be time consuming. Action Ethnography respects and adheres to the traditional methodology and the content can be mapped for collaborative exploration by the designer as an open dialogue with a type of meta-consumer, an interactive persona or scenario that can be explored and annotated.

There are three different views to consider with the argument of time-delay; working against the time constraints imposed upon consumer research as a result of the commercial implications to rapidly convert consumer research into usable insight and successful products. In the case of targeted problem solving and the development of a known opportunity the time taken to carry out full ethnography is an obstacle to its use. This will be, in part, because at the point of planning the new product development programme the addition of ethnographic work into the critical path of the project will extend the lead time to completion considerably, which gives rise to pseudo-ethnographic work or inspired techniques. The Action Ethnography framework supports a lighter version of ethnography, capable of mapping the content for as little or as much data as necessary.

Ethnographic work may be de-coupled from more short time critical projects and used to generate a catalogue of peoples' lives for exploration as and when required. The work may be self supported and run in parallel to more time conscious product development attending both to specific problem areas, and innovation. It may be that for an even lighter version of Action Ethnography the framework and associated tools may be used to represent personas, profiles and scenarios opposed to real people. The interplay, dependencies and critical systems approach could still be used with success.

Ethnography as an ad hoc tool for rapid exploration is possible with the AE framework, yet the fundamental nature of ethnography lends itself to long term deep contextual inquiry which should not be considered a weakness but a fundamental benefit to utilising this approach.

This research programme would benefit from the generation of a tool set tested against the framework for use within ethnographic inquiry; hoping to guide the development of new products, processes or systems. Feedback from the design team and ethnographers would be of great value to the framework. This level of evaluation was considered prohibitive within reasonable time scales of this research programme and remains an opportunity for future research.

This research programme has resulted in many targeted explorations into the literature; towards how designers currently receive consumer insight when designing for emotion. The needs of designers when in receipt of requirements were also addressed by the two and a half year case study into design practice. Direct input from designers regarding their preferences for U/CI receipt would be of benefit to the framework and remains an opportunity for future research.

## 12.2 Recommendations for future work

Recommendations for future work include the development of tools in accordance with the governance framework for the arrangement and output of ethnographic work to refine the framework through practice and the direct involvement of design teams.

Adopt and adapt the framework to inspire and develop new and existing consumer research approaches beyond that of ethnography for the ongoing development of their own communication strategy.

The framework may serve as an advisory resource to support ethnographers seeking to better attend to the needs of designers through their professional practice, requirements capture and communication.

The framework lends itself to the development of tools and other mental strategies to explore both known gaps and opportunities within specific problem areas, whilst capable of identifying new previously overlooked opportunities through the framework's inherent properties of discovery, collaboration and emergence to offer creative direction.

## 13.0 Publications

### Refereed International Conference Papers and Presentation

Watson, B., and McDonagh, D., 2004. Design and Emotion: Supra-functionality for Engineers. In: 4th Design and Emotion International Conference, Ankara, Turkey, July 2004

### Panel Reviewed Journal Articles

Watson, B., 2005. Designing for Excellence. Engineering Designer: The Journal of the Institution of Engineering Designers Journal. (September/October), 12-15.

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